GROW YOUR
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Complete
HANDYMAN ENCYCLOPEDIA

25
MELONS
PUMPKIN

do-it-yourself

Complete
Handyman

do-it-yourself

Encyclopedia

do-it-

low yield

medium yield

high yield

minimum effort

needs more care

requires special attention

crops in three months or less

crops in 4-12 months

crops in over 12 months

Complete Handyman yourself Encyclopedia

A STEP BY STEP GUIDE TO SUCCESSFUL
VEGETABLE AND FRUIT GROWING
BASED ON ALL 52 GARDENING HANDBOOKS
PUBLISHED UNDER THE TITLE

VOLUME
25
MELONS
PUMPKIN

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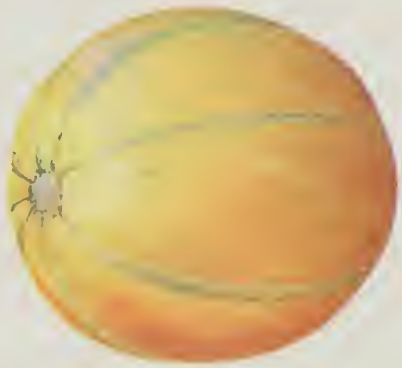
step-by-step growing guide

Melons



Cucumis melo (fam. *Cucurbitaceae*)
Hardy annual
Sowing to harvesting time: 4 months
Size: plants 1–1½ ft (30–45 cm) tall, 3 ft (90 cm) across, up to 5 ft (1.5 m) long in a frame; up to 6 ft (1.8 m) tall in the greenhouse
Yield: 2–4 fruits per plant

On a hot summer day, few fruits are as refreshing as fresh, juicy melon. In warm climates they grow abundantly outdoors but in cold ones they must be started indoors early and, perhaps, protected from early frost.

Given the right conditions, melons grow prolifically, even luxuriously.

Suitable site

If melons are to be grown outdoors in temperate climates, they will need to be grown in cold frames or under protective coverings, unless the garden is exceptionally warm and sheltered. A greenhouse probably gives a better and earlier crop, and such plants will not be so reliant on the summer being a good one. In subtropical climates there will, of course, be no need for protection of any kind, and plants can be grown outdoors throughout their lives.

Soil preparation

A well-drained fertile loam is the best soil for melons. Prepare the soil one month before planting. Dig a trench 1 ft (30 cm) wide and one spade's depth 1 ft (30 cm) deep and add one or two bucketfuls (depending on the richness of the soil) of well-rotted garden compost or leafmold per yard (meter) to the bottom. Cover with the soil removed from the trench and leave it in a mound so that water will drain away from it.

Alternatively for outdoor melons you can dig holes at 4 ft (1.2 m) intervals, again to 1 ft (30 cm) deep, and add the compost to the bottom of these, half-filling the holes. Once again cover with the removed soil and leave in a mound.

A little slow-acting fertilizer can be given, but do not give large dressings of nitrogenous fertilizer in particular as this will encourage sappy growth of stems and leaves at the expense of the fruit. A good general rate is 3 oz per sq yd (90 g per sq m).

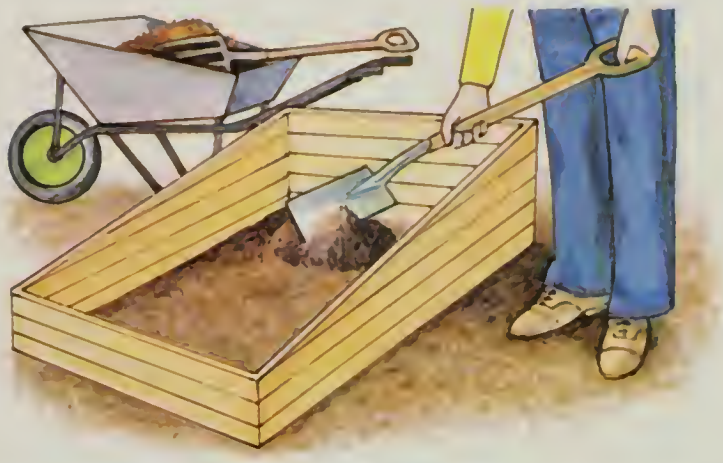
Melons do not like acid soils. Test your soil with a soil test kit and add lime as necessary.

Growing in frames

In cold temperate climates, some melon varieties will not grow successfully except in a greenhouse, but the usual method of growing hardier varieties is in frames. The frames should face southward so that they enjoy the maximum amount of sunshine.

SOIL PREPARATION AND SOWING

1. You can grow melons either under protective coverings or in frames. In frames dig a hole about 1 ft (30 cm) deep at the back of the frame and half fill it with well-rotted manure. Put the soil which you have dug out back into the hole and leave in a mound.



2. Sow the seeds on their edges ¾ in (1.9 cm) deep in 3 in (7.5 cm) pots. Place them in a warm place with a minimum temperature of 65°F (18°C).

3. Melon seedlings grow very quickly. Pot them into 5 in (12.5 cm) pots about five days after germination.

Sowing

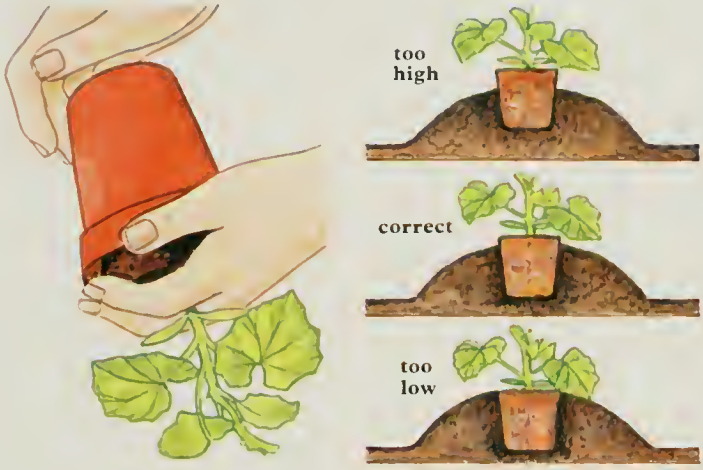
The roots of melons should be disturbed as little as possible, therefore sow the seeds individually in early spring in 3 in (7.5 cm) pots containing a good seed mixture. Water the mixture and place the seeds on edge about ¾ in (1.9 cm) deep in the center of the pots.

Melons are subtropical plants and will not germinate unless the temperature is at least 65°F (18°C) or more; preferably it should be 70°F (21°C). A heated greenhouse or warm windowsill is the best place for germination, but if you do not have either of these, a warm cupboard is the next best thing. Sow about twice the number of seeds that you will eventually require because, although most are likely to germinate, this will enable you to select even-sized plants for planting out.

Germination should occur within a few days. If the seeds have been germinating in a cupboard or other dark place, as soon as they have germinated move them to a light place with a minimum temperature of 60°F (15°C). Suitable places are next to the glass in a greenhouse or on a windowsill.

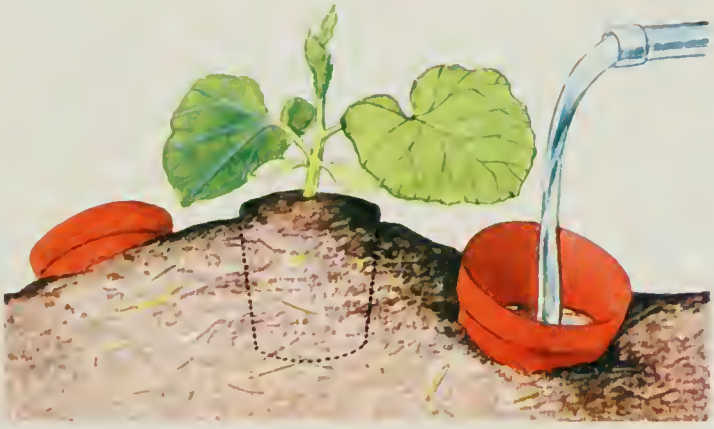
Keep the soil around the seedlings moist by careful watering—overwatering is nearly as bad as letting the soil dry out. Add a little liquid fertilizer to the water if the leaves start to look yellow. You

PLANTING OUT



4. Plant the seedlings outdoors when they are 6–8 in (15–20 cm) tall. Knock them out gently so that the root ball remains intact.

5. Plant with about ½ in (1.3 cm) of the root ball above the soil surface to prevent collar rot.



6. As a further precaution against collar rot, insert two pots into the soil; one on each side of the plant. Water the plants through the pots so that the water reaches the roots but cannot collect around the collar where it could cause rot.

will find that melons, once they have germinated, grow very quickly and they will need potting into larger pots within relatively few days after germination. Use a good potting mixture and 5 in (12.5 cm) pots.

Planting out

Melon plants are ready for planting out when they have between three and five leaves and are about 6–8 in (15–20 cm) tall. When planting in a frame, the position of the plants will depend on your method of training but, whatever you do, the growing tip of the plant will need to be pinched out just above the fourth or fifth leaf. You may find it necessary to do this before or at the same time as planting out, depending on the growth rate.

Before planting out draw the soil up into a low mound where the young plants are to go. They should then be knocked out of their pots, disturbing the root balls as little as possible. This is most easily done by placing your hand across the top of the pot, while holding the base of the stem between the base of two fingers. Then tip the pot upside down and gently tap it until the root ball comes loose.

Plant with about ½ in (1.3 cm) of the top of the root ball above the soil surface on the mound and firm the soil around

it. Melons are very susceptible to collar rot which attacks the main stem at soil level, especially if it is wet. Planting on a mound with part of the root ball above the soil prevents water collecting around the stem.

As a further precaution against collar rot, insert small pots, one on each side of the mound. The plants can then be watered by pouring water into the pots, thus watering the roots while avoiding the stem.

Although melons in temperate climates are planted out in late spring or early summer, you should be prepared for late frosts at night, and if these are forecast, they should be covered with newspaper tents or other materials.

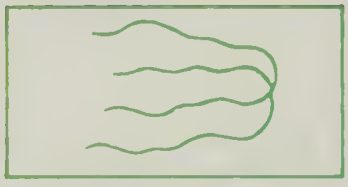
Training

Fairly soon after planting, frame-grown plants will need to be trimmed and trained. In frames they should be grown so that the frame is nicely filled with foliage but does not become crowded.

The normal method is to make a mound at the back of the frame and to put one plant on this. When it has pro-

TRAINING

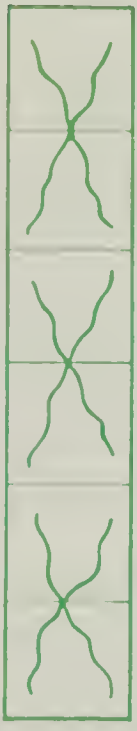
Pinch out the tops to encourage sideshoots.



In frames train four shoots forward from the back.

Alternatively, put two plants in opposite corners.

However they are trained the melons should be pinned down to the ground with twigs or bent pieces of wire.



Under plastic tunnels or other protection, the melons should be planted 4 ft (1.2 m) apart and trained to form a cross. Produce one melon on each main shoot.

G. E. Hyde

▲ *Delicious cantaloupe varieties can be easily grown under protective coverings or tunnels.*

duced four or five leaves pinch off its top to encourage the growth of sideshoots. The plant will normally produce a sideshoot in the axil of each leaf joint. The four strongest should be trained forward down the frame, evenly spaced out and pegged lightly down to the ground, using sticks or pieces of bent wire.

When the four sideshoots have each produced three leaves, they, too, should be pinched out, this time above the third leaf. Once again the plant will produce sideshoots and, as a result of the heavy pruning, should also produce lots of flowers.

When the fruits produced by the female flowers are about walnut size, select four—ideally, one on each main branch, all evenly sized and evenly spaced in the frame—and remove all the others and any that appear thereafter. At the second leaf beyond each fruit, cut off the remainder of the shoot and keep other sideshoots rigorously pruned so that the fruits are not shaded and the frame, although full with foliage, is not crowded—for better ripening.

There are some alternative ways of planting and training melons in frames. One method is to plant one melon in the middle of the frame and to train four sideshoots diagonally to the four corners. Another way is to plant two melons in diagonally opposite corners. To produce good quality and early fruit these can be pruned to just two sideshoots each, with one fruit per shoot. Alternatively, you can train four shoots from each plant to provide more but smaller fruit.

Watering, feeding and ventilation

The secret of growing good melons is watering. Water regularly and heavily, keeping the soil moist but not saturated. In hot weather, each plant may need 2½ gal (12 L) every day. Tepid water is best.

Continue to water heavily until the fruit has reached its maximum size and begins to ripen, when a distinct melon smell will emanate from the frame.

POLLINATION

Pollination is best carried out on a dry sunny day. Pick a male flower, remove its petals, and push it into a fully open female flower.

From then until the fruit is picked water only sparingly. Excess water may cause the fruit to split.

If bare roots appear above the soil surface, cover with a thin layer of soil, or a mixture of rotted manure and soil. Liquid feeding can be carried out, but should be done with caution, as too much can encourage rampant shoot growth. It is of most use where the quantity of manure available for the initial preparation was insufficient.

Although melons are subtropical it is possible for them to become too hot in a closed frame in hot weather. Prop the frame slightly open in the middle of the day to provide ventilation. In very hot weather, remove the covers entirely.

Pollination

Out-of-doors, melons may be pollinated by insects but do not rely upon them in greenhouses or frames. In such cases, you should pollinate by hand.

Male melon flowers grow together two or three in a clump and have a prominent central core. Females grow singly and have a round swelling just behind the flower where it joins the stalk.

Pollination is most successful when the atmosphere is dry, so pollinate in full sunshine in the middle of the day. Pick a

CARE AND CULTIVATION

When the fruits become about the size of a walnut, select one fruit on each main branch-ideally these fruit should all be the same size—and pinch out all others.

Then cut the fruiting shoots off after the second leaf beyond the fruit.

Support the developing fruits by placing a tile or upturned flower pot beneath them. When small cracks develop around the fruit stalk, harvest by cutting away a portion of the shoot on either side of the fruit stalk.

male flower, remove its petals, and then push it into a fully open female flower.

It is important that all the female flowers on one plant be pollinated at the same time; otherwise the one that is pollinated first may absorb too much of the plant's strength and you will get one large melon at the expense of the others. If one female flower develops long before the others, it is best to pinch it out and wait for more to develop at the same time.

Pollinate double the number of flowers than you want fruits, so that you have plenty of choice from which to select even-sized fruit. Decide whether you want a few large, well-developed ones, or more but smaller specimens. Your choice will to some extent be decided by variety. Small-fruited varieties readily support half a dozen or more fruits per plant, while two or three are ample for larger fruited varieties.

Care of the swelling fruit

As the melons develop they need to be supported. Place a piece of wood, tile or upturned flowerpot underneath the developing fruit. This will also help to keep it clean, and prevent possible damage from slugs or soil pests.

The fruits develop best if they are ex-

Patrick Mathews

➤*Heavy fruits can easily break off before they are fully ripe. Support the melons with nets attached to the training wires above.*

posed directly to the sun. Fold back or remove any leaves which are shading a swelling fruit.

Harvesting

Do not be in too much of a hurry to pick your melons. As they ripen the characteristic melon aroma becomes stronger and the melon becomes soft at the end opposite the stalk. Test this by pressing with your thumb. Also, the skin of ripe fruit may become patchy yellow; in netted varieties the pattern of ridges on the skin develops.

The final clue, however, is small cracks which develop on the fruit around the stalk joining the melon to the plant. Once these have appeared the fruit is ripe and ready for cutting.

Harvest melons by cutting away a small portion of stem either side of the fruit stalk. They can be stored for a maximum of three weeks at room temperature or slightly longer in a refrigerator, especially if they are picked a little before they are fully ripe. However, most varieties should be eaten at room temperature. Chilling reduces the flavor.

Freezing tips

Melons may be frozen—but not whole. After removing seeds and peeling, the flesh is sliced, cubed or scooped in balls. In containers, cover the fruit with a cold 30 percent syrup—two parts sugar dissolved in four parts water. Except for watermelon, the slices, cubes or balls may be crushed and one tablespoon of sugar added to each quart of crushed fruit; stir until it dissolves. Leave space at the top of containers according to their size and type. Seal, label and freeze. Melons for freezing should be ripe and have good color and firm flesh.

Greenhouse melons

Despite the fact that melons can be grown in frames, you will get better and earlier fruit in a greenhouse. The soil preparation for greenhouse plants is the same as for frame-grown plants. If you have a greenhouse or frame which has undersoil electric heating wires this is ideal.

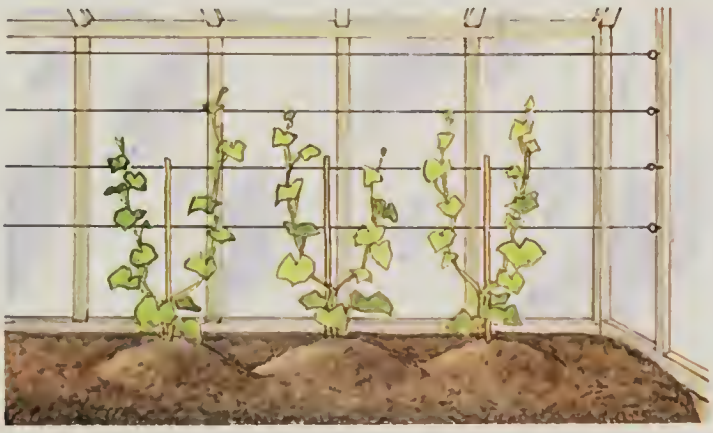
Seed is sown in the same way as for frame cultivation, but can be done in early spring, or even late winter, if you can maintain a suitable temperature, i.e., 60°F (15°C) minimum.

When planting in the greenhouse, follow the instructions for planting in frames, but space the plants farther apart—about 1½–2 ft (45–60 cm)—and put a 2 ft (60 cm) cane behind each.

Greenhouse plants are normally trained vertically on wires. Run the wires horizontally from one end of the

Brian Furner

➤*An alternative to growing melons in the greenhouse ground beds is to grow them in pots. Support plants on canes tied with string.*



Although cantaloupes grow well in frames, the best and earliest fruit is obtained in very cold climates in the greenhouse. Plant the young plants 1½–2 ft (45–60 cm) apart and train two main shoots from each plant up wires spaced 10 in (25 cm) apart.

house to the other, attaching the ends securely to the framework, beginning 18 in (45 cm) above ground. The wires should be spaced about 9 in (23 cm) apart and about 12–14 in (30–35 cm) away from the glass. The stems of the plants are then tied to the wire with soft string or raffia as they grow. Once planted, or if necessary before this, pinch off the growing point at about three leaves and allow two sideshoots only to develop, one on each side of the plant. Train these upward to the wires, with the support of the cane if necessary.

Most gardeners select four fruits (two on each main stem) but if you want very early fruits of especially good quality select only two. Remove all unwanted fruits.

Let the main sideshoots grow up to the roof before pinching off the growing point, and let sub-sideshoots grow so there is a good but not cramped mass of foliage. Do this by either cutting off the sub-sideshoots after a few leaves or by removing them completely, and repeat this thinning every few days once enough foliage has developed, but not so much that it becomes a shock to the plant.

Open the ventilators when the temperature in the house reaches 80°F (27°C) but close them again in the evening to preserve warmth for the night. Give extra ventilation once the fruit begins to ripen.

Damp down the benches and floor to keep the atmosphere moist. It also helps to lightly spray or syringe the plants with water once a day, especially in hot weather, when red spider mite is most likely to be troublesome. Water regularly and heavily, until the fruit begins to ripen, then gradually decrease it.

Support the developing fruits by nets attached to the training wires above. Nets can be made quite easily out of squares of 2 in (5 cm) netting. The square should be big enough to accommodate the expected size of your variety. Loop a piece of string through each corner of the net and tie to the supporting wire above.

Varieties

Muskmelons or cantaloupes

Ambrosia: a salmon-fleshed hybrid; juicy, sweet. Medium-sized with small seed cavity; resists powdery mildew.

Burpee Hybrid: deep orange, top flavor; vigorous. For home and market.

Canada Gem: oval-round, heavily netted; orange-fleshed with small seed cavity. Resists fusarium, powdery mildew.

Early Hybrid Crenshaw: vigorous, healthy, productive; no netting, yellowish when ripe. Fruits large, oval; freeze well.

Edisto 47: vigorous; resists alternaria, mildew. Close-netted with high sugar content, small cavity.

Honeyrock: All-America winner; sweet, almost round. Small, salmon-fleshed.

Iroquois: a standard maincrop for the North. Round-oval, ribbed; salmon-fleshed. Stands handling.

Mainerock: early, for northern gardens; salmon-orange, sweet.

Saticoy Resistant Hybrid: oval, firm, hard-rinded; resists fusarium, fruit spot, mildew. Sweet, rich, deep orange.

Sugar Salmon: very early, quality good; rich salmon, delicate flavor. Prolific.

Warm climate melons

Golden Beauty Casaba: large, round white-fleshed; keeps for months.

Honeydew: broadly oval, smooth; ivory skin, green flesh.

Honey Drip: large, smooth; creamy rind, greenish-white inside.

Citrons

Green Seeded: round, very productive, solid; deep green flesh used for candied peel and preserving.

Red Seeded: same size and shape as green but flesh is light colored and solid; used for preserving.

Brian Furner

▲ Honey Drip

Brian Furner

▲ Iroquois

Brian Furner

▲ Honeydew

Brian Furner

▲ Canada Gem

Brian Furner

▲ Golden Crispy, prolific English kind.

Iris Hardwick Library

▲ English sort, Hero of Lockinge.

Watermelons

Black Diamond: very large, up to 40 lb (18 kg), nearly round; flesh bright red, firm, sweet. Late, seldom sunburns.

Charleston Gray: large, up to 24 in (60 cm); red, crisp, fiberless. Resists fusarium, anthracnose, sunburn.

Dixie Queen: popular maincrop commercial variety; large, slightly oblong. Flesh scarlet, few seeds.

New Hampshire Midget: All-America winner; very early, good for short seasons. Small, red, solid, sweet; heavy yielder.

Brian Furner

▲ *Blenheim Orange, an English variety.*

A-Z Collection

▲ *Emerald Gem, popular abroad.*

Northern Delight: vigorous plants; fruits moderately large, numerous, flavorful.

Sugar Baby: round, "icebox" type, sweet, juicy, red-fleshed, good flavor.

Triple Sweet Seedless Hybrid: extra sweet, solid, large-fruited even in short-season areas.

Yellow Baby: yellow, sweeter than red-fleshed "icebox" types; extra hard skin permits longer storage.

Other varieties

Blenheim Orange: an old variety with scarlet flesh; small and prolific, very sweet flavor.

Superlative: succulent scarlet-fleshed variety with a "netted" skin.

Emerald Gem: green-fleshed with good flavor.

Ringleader: a pale green-fleshed variety producing large oval fruits.

Hero of Lockinge: white-fleshed with good flavor; can be grown in a cold frame.

Sweetheart (F_1 hybrid): very hardy, grows well under protective covers and in cold frames; gray-green skin with scarlet flesh.

Dutch Net: a fine flavored and aromatic medium-sized fruit; "netted" skin and orange flesh; easily grown.

No Name: green and yellow marbled skin; excellent flavor and texture; yellow flesh.

Charantais: small, prolific melon with orange-scarlet flesh; particularly juicy and well flavored.

Resistant Joy (F_1 hybrid): similar to Charantais but resistant to fusarium wilt and powdery mildew; medium-sized fruit with yellow flesh.

Golden Crispy (F_1 hybrid): very thin skinned; creamy-colored flesh; prolific producer of small to medium fruit.

Ogen and Ha-ogen: a mini-melon which produces up to 10 small round fruits per

vine; skin striped green and yellow; flesh creamy; aromatic with good flavor.

Florida Favorite: oval shape with green skin and pink flesh; normal size of melons 6–8 lb (2.8–3.8 kg).

Pests & Diseases

Melons are closely related to cucumbers and suffer from many of the same pests and diseases. Disease flourishes particularly in moist conditions and the worst problems usually occur in cold years when the air has been continually damp around the melons because no ventilation has been given. If you are forced to use a chemical spray, be careful. Melons, like most members of the Cucurbitaceae family, are sensitive to some chemicals. Check the label before you spray.

The wise gardener will also use the various preventive measures that help to minimize and in some cases to prevent disease and insect problems. One of the first is to select melon varieties that have been treated to resist certain of the diseases to which the fruits are most susceptible—insofar as these are available. Another is to be sure that the ground used for a garden has proper drainage and that the site will provide good circulation of air and sufficient light for the maturing plants.

Cleanliness in gardens is of prime importance, too, both during and after the growing season. Weeds and debris are attractive to insects for summer living, winter hibernation and egg laying, and they harbor diseases as well. So at all times, work to keep the garden and nearby areas clear of weeds, stones, piles of wood, leaves, bricks and rubbish. Also, promptly remove and destroy diseased leaves and dead, broken or diseased stems and sideshoots.

Whiteflies: these tiny mothlike insects cluster on the undersides of leaves, sucking the sap and causing speckled yellowing. The larvae secrete on leaves a substance called honeydew on which sooty mold fungus later develops. Spray infested plants with an approved insecticide.

Red spider mite: melons do not escape the attentions of this common pest. The small red mites can just be seen on the underside of the leaves which become gray-brown speckled, and yellow in bad attacks. In very serious attacks the plants themselves wilt. Unlike most melon diseases, however, the mites dislike damp, cold conditions and are unlikely to be a problem in coldish years. In hot weather, prevent attack by forceful syringing with water.

Aphid: another pest which is likely to be a serious problem on melons is the aphid. These little green insects collect on the growing point and on the undersides of leaves, where their attacks result in curled, discolored leaves and stunted plants. They can also spread virus disease. Spray with rotenone or pyrethrum.

Collar rot: a disease affecting melons. Soil-borne bacteria attack the base of the stem, causing it to decay and become soft and messy. The leaves wilt and the plants die. Prevention is better than cure with collar rot, and the most important point is to keep the soil around the base of the stem fairly dry. Do this by planting on mounds and by watering through pots buried in the mounds. It is not worth trying to save badly infected plants. Pull these up and dust the soil around adjacent plants with an approved fungicide.

Wilt: the symptoms of wilt are similar to those of collar rot but with wilt the base of the stem is not infected. Instead, wilt is the result of soil-borne fungi which rot the root. There are two different fungi which cause wilt and they respond differently to temperature. Plants attacked by the fungus fusarium may recover if the temperature rises. If they continue to wilt, the other wilt fungus, verticillium, is likely to be responsible and high temperature makes it worse. In this case, shade the plants and decrease the tem-

GUIDE TO MELON TROUBLES

Symptoms	*Probable cause*
Water-soaked, black or brown spots on leaves, shriveling leaves and fruits, cankers on fruits	Anthracnose
Wilting stems	Vine borer
Speckled gray-green on yellow leaves, tiny reddish insects on the underside of leaves	Red spider mite
Small green insects on growing points and undersides of leaves, especially young leaves	Aphids
Drooping leaves, base of stem at soil level rotten, soft and discolored	Collar rot
Drooping leaves and wilting plants but stem at soil level not rotten	Wilt
Whitish powder on leaves which in severe cases turn yellow	Powdery mildew
Yellow mottling of leaves	Virus

perature, with improved ventilation. Little can be done for serious attacks, however. In these cases pull up and burn the plants. To avoid this type of infestation, use treated seeds and do not plant where the fungi have previously appeared.

Anthracnose: a fungus disease of melons but especially troublesome to watermelons, particularly in the South. Small yellow or water-soaked areas on the leaves turn brown or black, the leaves shrivel, vines die and fruits either shrivel and die or develop black sunken cankers. Use treated seed, resistant varieties and spray with a state-approved fungicide.

Squash vine borer: this pest bores into the stems causing the vines to die. The best approach is to cover the joints with soil to cause numerous new root areas. Another treatment is to slit attacked stems lengthwise with a sharp knife to kill the borers, for sprays cannot reach them.

Cucumber beetles: both striped and spotted species attack melon foliage. Spray with Sevin or malathion at first appearance of damage.

Powdery mildew: this thrives where plants are kept short of water, especially in poor ventilation. The disease appears as a whitish powder on the surface of the leaves and in severe cases the leaves turn yellow. Stems and fruit may also be affected. Spray with a fungicide approved by your state authorities.

Virus: melon virus produces a yellow mottling on the leaves, which occasionally also produce wartlike outgrowths. The fruit may also be discolored. As with all viruses, there is no cure but as the virus is normally spread by aphids and other sucking insects, the best protection is to control these pests. Infested plants should be lifed and destroyed.

▲ *Red spider mites feed on the leaves, turning them a speckled gray-brown.*

growing ideas

A Fruitful Investment

The long-lived mulberry can be a delightful choice for a garden tree. It needs little care and will eventually produce a crop of delicious fruit.

There are about ten species of mulberry tree, but only a few are actually cultivated. *Morus nigra*, the black mulberry, is grown partially for its fruit. Another species, which has bland, white berries, is the parent of several named varieties, and the native red mulberry, *rubra*, has perhaps the most tasty fruit. *M. nigra* produces heavy crops of lovely dark red to black berries. Natives of the mild parts of Asia, Europe and North America, mulberry trees will grow in most areas where the climate is fairly mild. The trees can live for several centuries.

Mulberries are an increasingly popular choice for a garden tree. They are relatively small, with a maximum height and width of about 20–30 ft (6–9 m) when mature, they require little pruning, and are usually disease-free. You may have to be patient, however, and wait about eight years before a young tree bought in a nursery will start fruiting. Several nurseries now stock mulberry trees. Choose a strong, healthy specimen.

Spring is the best time to plant a young tree. As mulberries are slightly tender plants, choose a site which is sheltered, especially if you live in cooler parts of the cold temperate area. The soil should be deep, rich, and well-drained but moisture retentive.

Prepare the planting site by digging a hole large and deep enough to take all the roots of the tree comfortably. The roots are very brittle and, if you damage or cut them at planting, they will bleed severely and the tree may suffer a permanent check.

To plant, place the tree in the prepared hole, allowing the roots plenty of room to spread out. Plant it to the depth of the soil mark on the stem. Sprinkle a

Shortening lateral growth on a mulberry pyramid. Make cut as indicated; spur will form from the bud.

Harry Smith

◀*A well-grown mulberry tree forms a beautiful centerpiece in fruit garden or lawn. Although you will have to wait many years for your young tree to reach this size, you will be rewarded with crops of delicious fruit from this very long-lived tree.*

few handfuls of peat over the roots, and then return the soil to the hole. Tread the soil down to firm it and water the area.

You may want to apply a mulch of well-rotted manure, garden compost, leafmold or damp peat to keep down weeds and retain moisture. Apply it in a ring around the tree as far out as the branches extend, but do not let it touch the tree stem, or it may rot the bark.

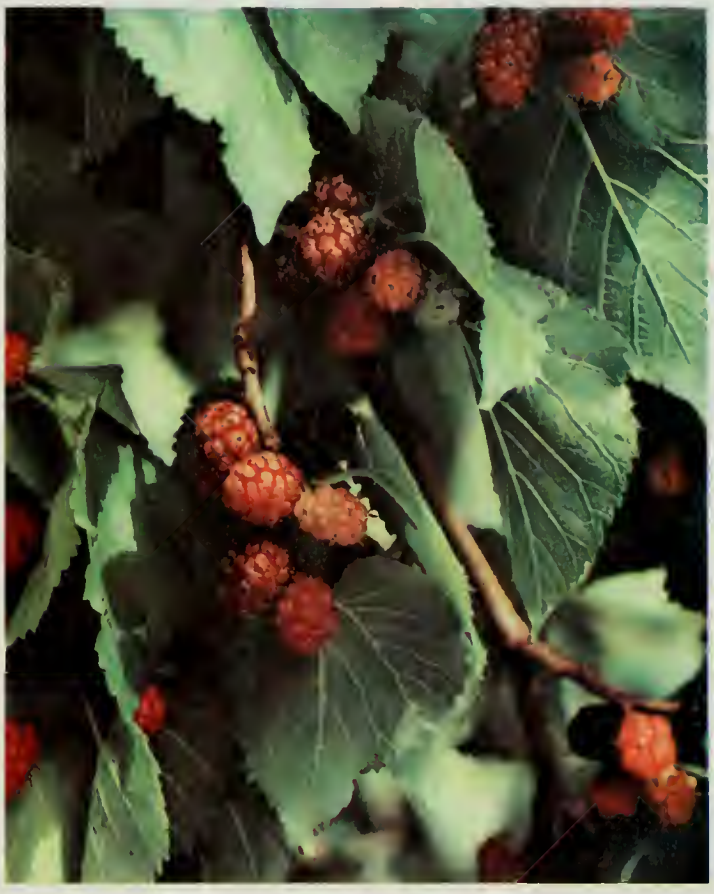
Care for new and established trees is similar. No special formative pruning is needed for mulberries; indeed, pruning should be avoided because of the tree's tendency to bleed. Pruning should be limited to the thinning out of crowded shoots and branches in winter. Even so, this should be carefully kept to a minimum, as the tree will bleed considerably from any wounds.

There are three methods of growing mulberry trees in your garden: as free standing standard trees or bushes, as pyramids and supported on walls.

Standards require only the removal of dead wood, as described above. Pyramid trees must be trained by carefully shortening the lateral growth so that it forms spurs. This should be done in midsummer. If you are growing your tree against a wall, train the branches about 1 ft (30 cm) apart, and cut back any sideshoots to form spurs in midsummer.

It is possible to propagate mulberry trees from cuttings. Make cuttings in mid-autumn of that season's growth; the cuttings should be at least 12 in (30 cm) long, with a 3 in (7.5 cm) long heel of old wood. Put the cutting into a well-drained sandy soil, in a protected position, to half its depth. The roots should start to form during the winter or early spring, and the cutting will be ready for planting the following autumn.

You can also grow mulberry trees in pots. These will need to be repotted every year, and will probably need to be planted out after about five years.



Bruce Coleman

➤*A heavy crop of mulberries. The fruit ripens over a period of several weeks, beginning in late summer. Pick the darkest berries to serve as a dessert. You can leave the red fruits to ripen further, or pick them immediately for cooking.*

All mulberry trees, however they are grown, require occasional watering, and they will need frequent watering during dry weather. Trees which are fruiting will also benefit from an occasional watering of liquid manure. As the tree matures, the crooked branches become even more gnarled, and they may need to be supported with poles. Older, established trees often require some sort of support for their branches.

The fruit of the mulberry tree begins to ripen in late summer. Ripening is irregular, and the fruit is available over quite a long period. The fruit is slightly acid when underripe, and is delicious then when made into jams, tarts or other dishes. Leave it to ripen fully on the tree, and you will have lovely, almost black, sweet berries to serve with cream for dessert. But remember that the dark red juice will stain everything it touches, including your hands, and can be hard to remove. Also remember that mulberries are one of the favorite treats of birds, so protect your crop by netting the tree.

Pick mulberries by spreading a sheet on the ground and gently shaking the branches. Most of the berries will fall off when ripe and can be gathered right off the ground—if you beat the birds and squirrels to them. Shake the tree carefully, as the wood is very brittle and can break.

Mulberry trees are almost free of any garden pests or diseases. Only canker attacks the trees, and this is rarely severe enough to need treatment.

step-by-step growing guide

Mushrooms

Agaricus bisporus (fam. *Agaricaceae*)
Capped fungus
Sowing to harvesting time: 4–12 weeks; the harvest then continues for 11–12 weeks longer
Size: mushrooms up to 3 in (7.5 cm) high; caps vary from about 1 in (2.5 cm) across for button mushrooms to 4 in (10 cm) across for mature ones
Yield: at least 1–2 lb (0.45–1.0 kg) per sq yd (sq m); can be much higher, depending on the quality of compost or soil

One of the most popular foods, mushrooms are different in character, shape, and method of cultivation from other vegetables. They are grown commercially, but mushrooms can easily be cultivated on a smaller scale by the home grower. Mushrooms are expensive in the stores all through the year, and it is much more economical to grow them yourself, as the initial outlay is quite small. A second point in favor of home-grown mushrooms is that mushrooms are at their best when freshly picked; they quickly lose their flavor and become tough and stale. The best guarantee that the mushrooms are fresh is to harvest them yourself just before cooking. A third point is that you can superintend the ingredients and making of the growing medium yourself, and so choose materials for the soil medium which will insure the same rich flavor in your home-grown mushrooms that the wild field mushroom has. In the kitchen, mushrooms can be used whole or chopped, and eaten raw in salads or cooked by almost any method. Most of the work in growing mushrooms is connected with the preparation of the special medium in which they grow; after it has been prepared, very little is needed in the way of cultivation and care.

Botanically, mushrooms are the fruiting bodies of the fungus *Agaricus bisporus*. The entire growth above the ground is edible; it consists of a white, creamy or brownish cap on a brownish stalk. Mushrooms change shape slightly as they mature. Young mushrooms first appear as white pinheads on the surface of the mushroom bed; they develop short stalks as the buttons, or caps, grow larger. At this stage the caps are spherical in shape and the gills are covered with a membrane, or veil, which is connected to the stalk. As the mushroom matures, the stalk grows longer and the cap grows larger and begins to flatten out. The membrane tears as the cap expands, and exposes the brownish gills beneath.

The usual method of propagation is by spores, which are produced in the gills and correspond to the seeds of green plants. Because the brownish black powdery spores are microscopic in size and difficult to germinate except under special conditions, mushrooms are normally

Grant Heilman

➤*Although they are cultivated differently from other vegetables, mushrooms are easy, quick, and very economical to grow. Well-established beds will crop for several months.*

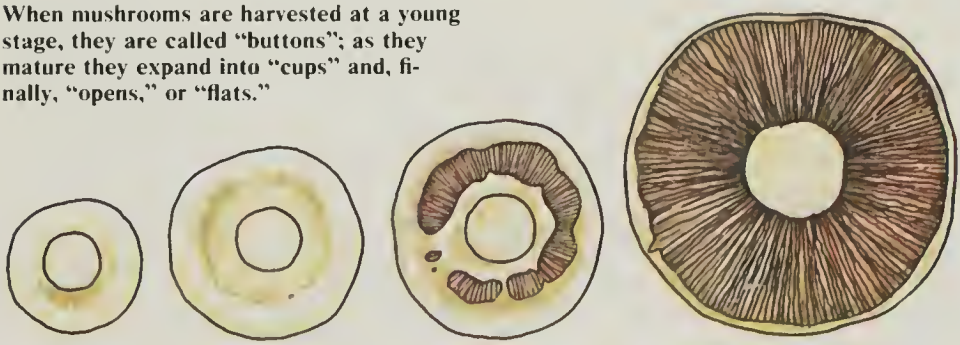
grown from spawn. Spawn (*mycelium*) is the germ tube produced by the spores; each appears as a long, threadlike white filament. The spawn absorbs food and moisture from the soil medium and eventually produces the fruiting bodies (mushrooms) which are then cropped.

Cultivated mushrooms are closely related to the edible wild mushrooms (*A. campestris*) found in summer and autumn in fields and meadows. A word of warning, however: there are species of wild mushrooms which are highly poisonous, and very similar in appearance to those which are edible. Unless you are fully knowledgeable about mushrooms and can identify them accurately, it is best not to pick wild mushrooms for eating.

Suitable sites

Mushrooms are grown commercially in specially built mushroom houses and artificial caves, but the home grower should be able to find a suitable site, either indoors or out, for growing smaller crops of mushrooms. The main factors in growing mushrooms successfully, besides a suitable medium, are stable air temperature and moisture; you must select a site where these can be controlled. Indoors, you can use the

When mushrooms are harvested at a young stage, they are called "buttons"; as they mature they expand into "cups" and, finally, "opens," or "flats."



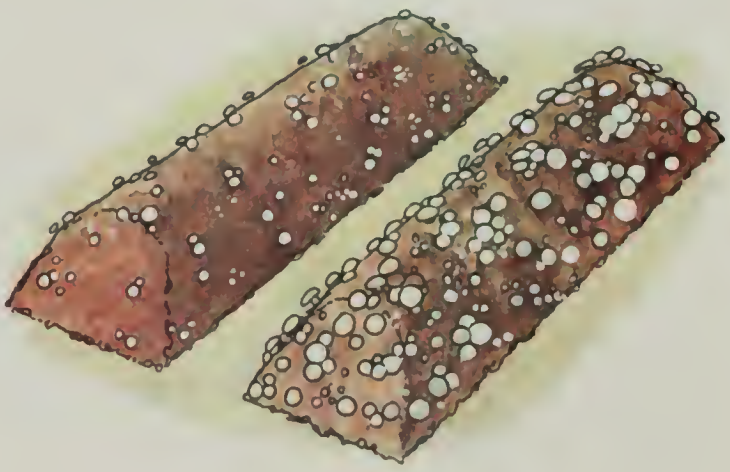
floor of a cellar or shed; outdoors, they can be grown in greenhouses, cold frames or, in mild areas, in the open. Wherever they are grown, it is probably most convenient if you use boxes, other than beds, to contain the growing medium, remembering that boxes have the disadvantage of being wasteful of space.

If you are growing them in a shed or cellar, it must be clean, waterproof and dark. It is a good idea to disinfect old buildings before attempting to use them for mushroom growing, and dust the floor with lime as an additional precaution. It will be much easier to regulate the temperature inside a building if it is insulated; mushrooms will not grow if the temperature rises above 80°F (27°C) or falls below 45°F (7°C). There should also be some form of ventilation, so that the air can circulate freely. You can grow your mushrooms in wooden boxes or trays, with a depth of about 8 in (20 cm) and any convenient size. You can also make up ridges directly on the floor, each about 1½ ft (45 cm) deep, and with a base of 2 ft (60 cm), rounding the top of the ridge. Or you can use a flat bed about 8–10 in (20–25 cm) deep, but make it convenient for picking.

You can grow mushrooms in your greenhouse from midautumn through to midspring, if it is heated; under the benches is the best place to grow them, putting the growing medium either in boxes or directly on the greenhouse floor. They can also be grown on the benches in containers. You will have to shade the glass fairly heavily as mushrooms become brown when exposed to sunlight, or make some arrangement to cover the containers or bed to exclude the light to some extent.

Outdoors, mushrooms can be grown in frames which are fairly deep; you will need a depth of at least 1½ ft (45 cm), though 2 ft (60 cm) is better. This allows a depth of growing medium of between 1–1½ ft (30–45 cm) and also gives reasonable conditions in which to keep the right temperature and humidity and allow the mushrooms room to grow. Glass will also be needed, and mats to shade the growing mushrooms. In very mild and humid areas, mushrooms will grow outdoors on ridges from late winter through early summer and again from early autumn through late autumn. Make the ridges 24–30 in (60–75 cm) wide and 18 in (45 cm) high, and as long as is suitable. You can have them higher but not lower, since less good results will be obtained. You will need a good supply of straw and plastic sheeting in case of heavy, prolonged rain.

You can also grow mushrooms in a lawn or field. This is a chancy method, but can sometimes produce successful results. Simply lift a piece of turf in late summer and place the spawn beneath it.



You can grow good mushroom crops on ridges outdoors in mild humid areas. Make ridges 2½ ft (60–75 cm) wide, 1½ ft (45 cm) high, and as long as is suitable.

GROWING MUSHROOMS IN GRASS

1. Lift a section of turf in late summer, when soil is moist and air warm and humid.

2. Using a small fork, loosen the exposed soil.

3. Scatter the spawn on the surface, then replace the turf and firm lightly.

4. The first flush should appear about a month later, depending on weather and soil conditions.

The soil should be moist and contain organic matter to provide nutrients, and the atmosphere warm and humid. A touch of frost will not damage outdoor grown mushrooms. Finally, it is now possible to buy mushroom kits which take the backbreak out of mushroom cultivation. They consist of a container containing prepared medium which has already been spawned; you simply add water to start the spawn growing, carry out a few other simple instructions and pick mushrooms a few weeks later.

Growing medium preparation

Since it is important to know the temperature of the growing medium during the various stages of making it, you should obtain a soil thermometer.

The easiest way to grow small crops of mushrooms is to buy mushroom kits. These kits contain prepared spawn and a growing medium, plus instructions for growing and harvesting the crop.

G. W. Ganney

▲ *Manure being prepared for growing mushrooms is stacked in a heap and kept moist.*

Mushrooms are usually grown on a growing medium made from strawy horse manure. Other materials can be used, such as pig or cow manure or any animal manure; wheat straw with fertilizer added has been tried and is much used commercially, also barley or bean straw, again with the addition of nutrients. If you are making a growing medium from horse manure, make sure the manure is fresh and has not been exposed to the weather for a long time. You should begin preparing the medium about a month before it is needed. Stack the manure in piles about 4 ft (1.2 m) high. This can be done outdoors in the summer; otherwise the stacking must be done in a shed or similar building to protect the manure from wet weather. If it is at all dry, water the manure; it should be moist but not really wet. If it is almost pure dung, without much litter, add straw in the proportions of 1 part straw to 10 of dung (by volume) and mix thoroughly. Leave the stack alone for about seven days, during which time it will begin to ferment; the temperature inside it should be in the region of 150°F (65°C). This will kill all insect pests and should destroy most fungal diseases. Once it has reached this temperature, you can turn it, putting the manure that was on the outside into the center of the new heap, and breaking up all lumps as you proceed. Shake it at the same time to aerate it. Turn the stack another four or five times, at about four-day intervals, moistening the manure if it is at all dry. In about three to four weeks time, the material should be brown, crumbly and moist, with the straw still recognizable but only just, and there should no longer be a smell of ammonia. It will now have a temperature of about 80°F (27°C) and is ready for use. Commercial growers often add gypsum, at the rate of about 1 lb (0.45 kg) gypsum to 88 lb (40 kg) manure—during the first turn—to prevent the finished product from being excessively sticky.

When horse manure is unavailable, you can use other animal manures as a

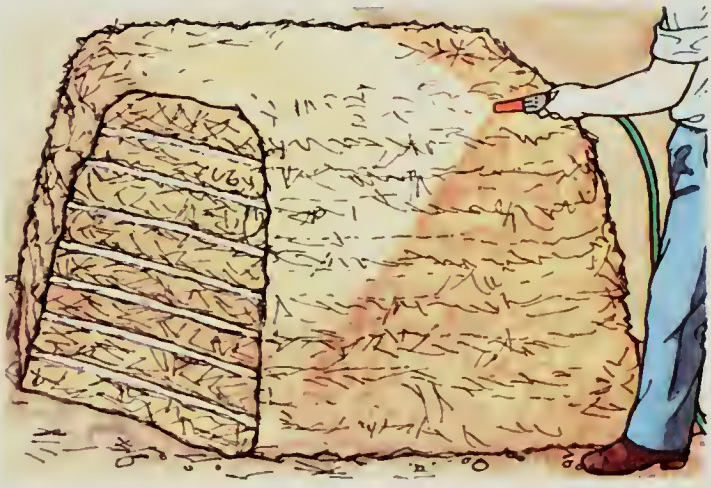
substitute, ready-made mushroom "soil" or a home-made one. The latter is made with the aid of an activator. A proprietary brand of this chemical can be bought from some nurseries and garden shops. Specific instructions will be provided, but the general principle is simple. Make a heap with alternate layers of straw (or any other similar materials suggested) and activator and then follow the same procedure outlined for manure. The heap must also be kept moist but not wet.

Spawning and casing

The spawn, generally shaped into fibrous blocks (though now also available in granular form) can be bought from nurseries or garden centers. For the spawning of your mushrooms, you need an air temperature of about 70°F (21°C); after covering it can be dropped to about 60°F (15°C). Mushrooms will grow at any temperature above 50°F (10°C), but more slowly at the lower temperatures. Too high temperatures can kill the spawn. This is, of course, more easily maintained within a building than outdoors.

When filling boxes or trays put the growing medium in firmly, but not packed down hard so that air is completely excluded. Beds and ridges should similarly be packed firmly and evenly,

PREPARING GROWING MEDIUM



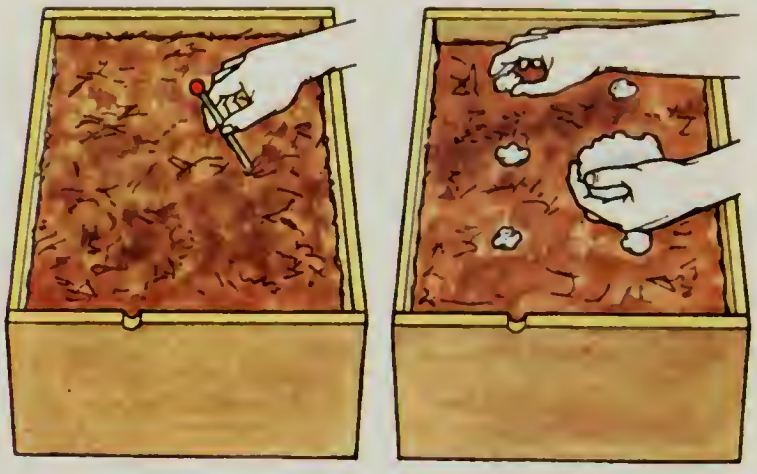
1. Build manure stack about a month before growing medium is needed; spray with water to promote fermentation, but do not soak.

2. Use a fork to turn the heap four or five times every few days to be sure it rots evenly and stays moist. When ready, it should be brown, moist and crumbly.

INDOOR CULTIVATION

1. Test the soil and plant spawn when the temperature falls to 70°F (21°C).

2. Break walnut-sized pieces of spawn from the cake and plant them 1 in (2.5 cm) deep and 8–10 in (20–25 cm) apart.



but not trodden—disease can come in on footwear. Ridge beds, which give slightly higher yields from the same floor space, are usually made in pairs. Make the base of the ridges 2 ft (60 cm) wide, gently tapering at the top to 6 in (15 cm). Height should be 1½ ft (45 cm) from top to base.

When the growing medium has been put into position, its temperature will again rise, to about 100°F (38°C) and will then gradually fall. Keep the bed moderately well watered during this period—when squeezed, it should feel damp but should not drip water. After a few days, the temperature will fall to 70°F (21°C). This is the correct moment to insert the spawn; if the temperature is lower, growth may be very slow.

3. If using grain spawn, scatter it on surface; cover box with black plastic.

Heather Angel

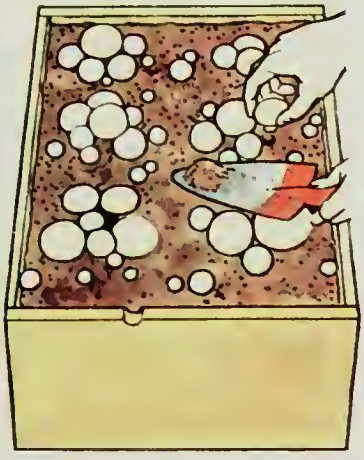
These rye grains have been impregnated with mushroom mycelium spawn.

R. J. Corbin

Cake mushroom mycelium spawn is sold dry. It is activated by warmth and moisture.

4. Prepare casing of sterilized soil, or a mixture of peat and gypsum. Mix thoroughly.

5. Ten days after white threads of mycelium spawn appear, spread casing lightly over growing medium to a depth of 1 in (2.5 cm).



6. If the casing seems to be drying out, water sparingly; always keep box well-ventilated.

7. Pull mushrooms from box with a twist of the hand; do not cut.

Break the cake into fragments about the size of a walnut and insert pieces about 1 in (2.5 cm) deep in the growing medium, at a spacing of 8–10 in (20–25 cm) in each direction. Press the material firmly around and over the spawn, so that no air pockets develop.

After a week or so, the mushroom mycelium will be seen spreading like fine grayish to white threads through and on the growing medium. Leave it for a further ten days, then cover it with a casing of fine, moist soil whose pH is between 7.0 and 8.0. The casing helps to retain the heat of the bed and also helps to conserve moisture. A fine, rich, loamy soil is ideal, and if it has been sterilized, so much the better. Cover the medium evenly to a depth of 1 in (2.5 cm). Alternatively, the casing can consist of a mixture of moist peat and gypsum, in the ratio of three to one by volume.

Care and development

The mushrooms should appear about two to three weeks after casing, depending on the temperature. During this period water sparingly, and only if the casing seems to be drying out. If the beds are overwatered, and the manure beneath the casing is drenched, the spawn will be killed. If, on the other hand, the beds are too dry, the spawn will grow away from the surface of the bed, and deeper into the mixture, with the result that no mushrooms will appear on the

Heather Angel

▲ *Commercially, mushrooms are cultivated on shelves in specially built mushroom houses.*

surface of the soil. Ideally, the casing should be kept moist with lukewarm water, applied as a fine spray. During this time, the temperature of the bed must not be allowed to rise above 70°F (21°C) for more than brief periods, or the mycelium will be damaged. On the other hand, it should not become cool, and it is a good idea to cover outdoor beds or ridges with a layer of loose straw up to 1½ ft (45 cm) thick, depending on the time of year. Keep the beds well-ventilated, but avoid drafts. The air around a mushroom bed should be moist but also fresh.

Harvesting and aftercare

One to two months is the normal span of time from spawning to cropping, but it can sometimes take longer. If the manure has not fermented properly, or there is inadequate moisture or heat at any time, it may take up to twelve weeks for the mushrooms to be ready.

The developing mushrooms appear directly over the spawn, so the crops should be evenly distributed over the surface of the bed. Mushrooms tend to reach maturity all at the same time, in "spates" ("flushes"). When the first flush is ready for picking, twist out each mushroom and break it off from the cluster. You should clean out the stem bases from the growing medium as you pick the mushrooms, to avoid infections and infestations gaining a hold on the beds. After this routine cleaning, fill the holes in the bed with fresh soil. Water the bed thoroughly, although not to the point of saturation. A second flush should appear in about ten days.

Cropping will continue for about three months. If the bed stops cropping prematurely, give it an additional thorough

watering. This is often all that is needed to start production again.

Beds in production will need a good steady supply of water as long as cropping continues; make sure that the temperature of the water is the same as the temperature of the bed. Maintain humidity by spraying the area. The beds must have adequate ventilation.

When the last of the mushrooms have been gathered, the growing medium should be immediately cleared. Never use any of the old material for growing mushrooms again, although it makes excellent manure for other crops. Give the frames, boxes or other containers a thorough disinfecting to remove any traces of insects or infections. You should also lime-wash the walls and scrub the floors.

Exhibition tips

Timing mushrooms for a particular show date can be a bit risky; mushrooms can be ready for harvesting from one to two months after the spawn has been planted. To avoid disappointment, prepare a small mushroom bed two months before the show, another six weeks before, and a third bed a month before the show date.

Mushrooms can either be shown as buttons, with the gills still covered by the membranes and not visible, or as cups, when the gills are open but have not yet fully expanded. Twelve is a common number required, either as single exhibits or as part of a collection of vegetables. Because mushrooms deteriorate rapidly once they are picked, delay the picking until the last possible moment. Pick more than you need for the exhibit so you will have replacements at the show bench, should they be necessary. Whether they are shown as cups or buttons, they should be as uniform as possible.

There is very little pre-show preparation needed. Simply trim the stems to a uniform length of 1 in (2.5 cm). At the show, the mushrooms can be displayed in a shallow basket, box or tray. They will look best displayed near the front of the exhibit.

Varieties

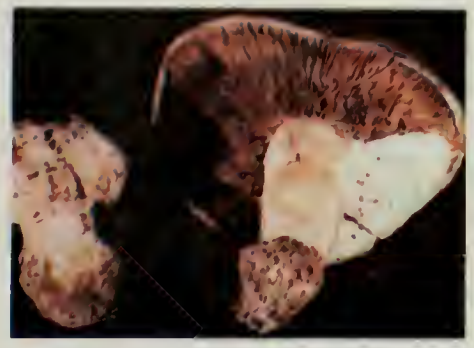
There is only one kind of mushroom available to the amateur grower; this is the species *Agaricus bisporus.* Commercial names attached to mushroom spawn only indicate the particular firm which has produced and marketed the spawn.

Pests & Diseases

White mold (bubbles): this is a fungal disease which covers the mushrooms with white moldy growths; the gills are particularly vulnerable to infection, and a badly attacked mushroom may simply be a rounded mass, completely covered with the mold. In very bad attacks, whole clumps of young mushrooms can be enveloped in white mold and killed. Because white mold usually enters the beds in the casing soil, the best precaution is to use only peat or sterilized soil. Once an attack of white mold has occurred, remove and burn all infected mushrooms and stumps immediately. After the final crop, spray containers and inside the building or greenhouse with a solution of formalin or zineb.

White plaster mold: this is another fungal infection, which shows up on the surface of the beds as a pale powdery growth much like a top dressing of lime in appearance. It prevents the growth of the mushrooms and usually appears as a result of improper preparation of the manure. It is favored by alkaline conditions; the use of gypsum in the growing medium will generally prevent its appearance. If the beds have suffered from white plaster mold, disinfect the containers or building after the final crop.

Brown plaster mold: a relatively minor fungal infection, this appears on the surface of the bed first as a white fluffy patch. In a few days, the center of the white patch will turn brown; eventually, the whole fungus turns brown and powdery. As with white plaster mold, im-



▲ *The fungal disease white mold (bubbles) covers mushrooms with white, moldy growth.*

▲ *These brown, sticky mushrooms display the symptoms of brown blotch infection.*

proper manure preparation is the main cause. Hygienic conditions and properly made growing medium will help to prevent its appearance.

Brown blotch: this bacterial infection makes the caps brown, sticky and inedible. Because it thrives in warm, moist still air, proper ventilation and moderate watering can avoid it.

Mushroom bed sclerotium: if you find branch-shaped, hardened growths in the casing soil, often with pinkish tips showing just above the soil surface, then your beds are infected with mushroom bed sclerotium. Pull them out of the soil and destroy them; you should still be able to harvest good crops.

Dry bubble: light brown spots and blotches appear on the mushroom cap, and later the mushrooms become distorted and the stalks split and peel. They become dry and leathery in time. Treat as for white mold; chlorinated water is also helpful.

Wood lice: these pests thrive in the humidity, darkness and decaying manure which are necessary for growing mushrooms. Once they enter the beds, either with the manure or else through cracks or holes in the shed, they will multiply rapidly. They eat holes in the developing buttons, and in severe infestations the entire crop can be ruined. Pyrethrum applied to the bed is a good control.

Cobweb disease: a downy or fluffy mold appears on the growing medium surface and grows all over the mushrooms also, which then rot completely. Sometimes the mold has a pinkish tinge. Treat as for white mold.

Rose comb: the symptoms of this physiological disorder are deformed or cracked caps. Often gills are produced on top of the caps. Rose comb is caused by exposing the beds to fumes from oil stoves, or by applying mineral-based sprays.

Slugs: slimy, silvery trails on the surface of the bed and ragged holes in the buttons indicate the presence of slugs. Hand pick if possible, at night when they feed, or eliminate them with proprietary slug baits as soon as they are seen, but put the bait near to the beds or boxes rather than on them, as slug baits are poisonous to humans also.

Springtails: these tiny jumping insects often appear in great numbers and can do an enormous amount of damage. They attack the stalks, gills and outer edges of the caps, which then become slightly pitted. Once they have attacked the developing buttons, no further growth takes place and the crops will be severely stunted. Fermenting manure which has heated up to the temperature recommended should not be troubled, but spraying or dusting the growing medium with pyrethrum or rotenone should control an infestation.

Ministry of Agriculture, Fisheries & Food

The physiological disorder rose comb appears as extra gills growing atop the caps.

Ministry of Agriculture, Fisheries & Food

Mites have eaten holes in the cap and stalk of this mushroom; control is difficult.

Sciarid flies: these tiny black gnats lay eggs on the surface of the growing medium and at the base of the mushroom stalks. The emerging tiny legless larvae, which are white with black heads, enter the base of the stalk and tunnel upward; infected mushrooms decay. Treatment is the same as for springtails. High temperature during manure fermenting in the first place will destroy larvae.

Mites: there are several species of mites which attack mushrooms, all of which eat internal holes in the stalks and caps. Rotenone and pyrethrum offer some measure of control. If the infestation is severe, the only completely effective method of control is to clear out all the beds, discard all the soil and manure, and disinfect the walls and floor of the shed with boiling water.

Phorid flies: these are similar to sciarid flies, and both insects do much the same damage. Phorid flies, however, are active mainly in the summer months, while sciarid flies occur all year round. The best preventive measure against phorid flies is to cover all ventilators, doors and windows with fine mesh screening. If an infestation does occur, spray or dust the beds with rotenone or pyrethrum.

GUIDE TO MUSHROOM PROBLEMS

Symptoms	*Probable cause*
Holes eaten in buttons	Wood lice
Ragged holes in mushrooms; slimy trails on casing	Slugs
Pitted stalks, gills and outer caps	Springtails
Tunnels in stalk, decayed mushrooms	Sciarid flies Phorid flies
Holes eaten inside stalks and caps	Mites
White mold growths on mushrooms	White mold (Bubbles)
White powdery mold on casing	White plaster mold
White fluffy patches on casing, later turning brown	Brown plaster mold
Caps turn brown	Brown blotch
Pink-tipped, branchlike growths in casing soil	Mushroom bed sclerotium
Light brown spots on cap, later distortions of mushroom and splitting of stalk	Dry bubble
White downy or fluffy mold on growing medium and mushrooms sometimes pinkish	Cobweb disease
Deformed, cracked caps; gills on top	Rose comb

growing ideas

Full-of-flavor Chinese Greens

Milder in flavor than the true cabbage, Chinese cabbage makes a welcome change from the more common salad vegetables and cooked greens.

This vegetable is a relative newcomer to the West. Often referred to as Chinese leaves, it belongs to the mustard group of the large Brassica family. There are two basic types: Chinese cabbage and Chinese mustard. The cabbage types are tall, oval in shape, and resemble cos (romaine) lettuce, with crisp, tender hearts and a delicate flavor similar to that of celery. This vegetable is most useful in

Pat Brindley

←Freshly cut heads of crisp, pale green Chinese cabbage. These Bok Choy are one of the best varieties for home growing, and one of the tastiest. The inner leaves and tender hearts make delicious autumn salads.

Bernard Alfieri

▲ *Well-tended rows of loose-leaf mustard-type Chinese cabbage ready for harvesting.*

autumn and early winter when other fresh greens, particularly any suitable for salad, are getting scarce. Mustard types, which form looser heads, can be used as a substitute for spinach. The leaves, however, are larger than any spinach leaves, being frilled and waved in some varieties and curled in others.

Chinese cabbage and mustard may both be raised from seed. The main problem in growing them, however, is that the plants tend to bolt—run to seed—in hot, dry weather. Of the two forms, Chinese mustard is the hardier and more resistant to dry conditions. Another tendency is that flower heads will immediately appear once the cabbage heads are fully developed, so pick and use the plants as soon as they are mature. The best way to be sure of a suc-

cessful crop is to bring the plants to maturity quickly, avoiding the checks to growth brought about by excessively dry or frosty weather. Delay sowing until three months before frost and keep the soil moist at all times, especially in the early stages. As the plant is fast growing, it should be very easy to get a good crop, even from a late sowing.

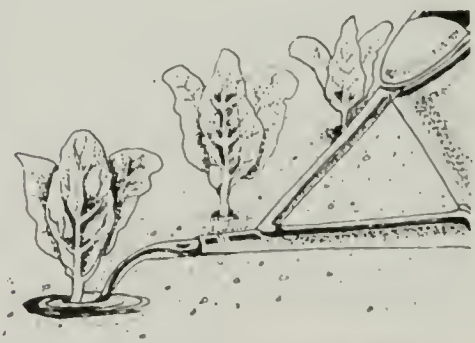
Apart from taking care with your timing, Chinese cabbage is fairly easy to grow and can provide a useful and delicious addition to your vegetable garden. Since it likes a semishaded position, you can use it to fill the gaps between rows of tall-growing vegetables, such as peas, provided the rows are not too close together. Being quick to mature, Chinese cabbage can also be used for catch-cropping—growing plants on ground which is temporarily vacant. Try growing it on a site left empty by early potatoes, broad beans, peas or lettuce.

Chinese cabbage does not react well to transplanting, so you should sow the seed in the place where the plants will grow to maturity. It does best on a rich soil that retains moisture and is not too acid. The soil should not be too light or sandy, as soil of this type does not retain moisture well. Choose a site which was enriched with plant food and humus at the beginning of the season, but do not add any further artificial food, as this could cause the plants to bolt. Lime may be added to the soil prior to sowing in the form of agricultural lime at the rate of 2 oz per sq yd (60 g per sq m). Clear any weeds and rake down the soil to a fine tilth just before sowing.

Generally, you should sow the first seed not earlier than three months before frost, although seed of the hardier mustard varieties may be sown a couple of weeks earlier. To ensure a steady supply of the vegetable, make successive sowings in the following weeks. The last sowing, however, should be early enough to give the plants time to mature before the first frosts set in. Allow about 75–85 days from sowing time to maturity for cabbage types, and about 45 days for mustard varieties.

To sow, make drills ½ in (1.3 cm) deep and about 1 ft (30 cm) apart if you are growing loose-leaf, but about 18 in (45 cm) apart for cabbage. Sow the seed thinly. Sowing individual seeds about 1 in (2.5 cm) apart is a little more time consuming, but it does make thinning later far easier. Since the seeds are often sown comparatively late in the season, dry periods may occur around the sowing time. Either water the ground very well beforehand, or draw out the drill and water that very carefully—a small-spouted can is best—until it is almost muddy. After sowing the seeds, cover them with the dry soil from either side of the drill. This dry soil acts as a mulch, prevents the moisture beneath from evaporating, and ensures that the seeds get off to a good start.

Chinese cabbage does not require a great deal of care. It needs moisture if it is to grow satisfactorily, so if the weather is very dry, watering will be necessary. An occasional very heavy watering is far more beneficial than intermittent light watering. After watering, mulch the soil with a 2–3 in (5–7.5 cm) layer of organic matter such as lawn mowings, spent mushroom growing medium or garden compost. This preserves the moisture in the soil so that the plants will make steady growth even in a prolonged dry spell. Hoe between the plants frequently during the growing period to control weeds.



Give the plants an occasional heavy watering.

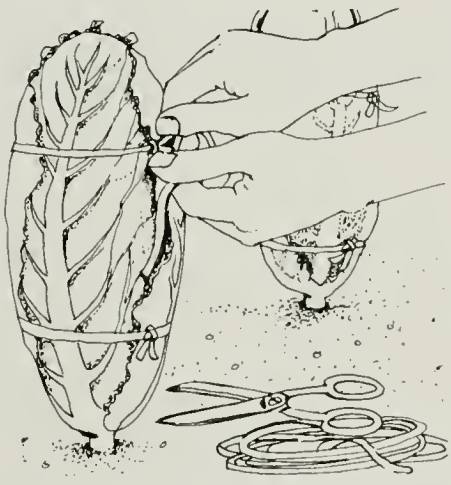
When the seedlings are large enough to handle, thin them out to about 8 in (20

cm) apart for cabbage varieties, and about 15 in (38 cm) apart for the others. Growth can be encouraged by the addition of a quick-acting nitrogenous fertilizer, such as dried blood, when the plants are about 2 in (5 cm) tall.

Fortunately, Chinese cabbage is prey to few pests and diseases, although you may have to keep an eye open for slugs, caterpillars and aphids. Gray mold can attack the plants, but this rarely happens in a well-tended plot.

When the cabbage heads begin to swell, you may want to tie them with string or raffia to make sure that the hearts are blanched white and sweet.

Protective covers extend the cutting time.



To blanch, tie the leaves at top and bottom.

Make one tie around the base and a second tie close to the top of the leaves.

The main season for harvesting summer-sown Chinese cabbage is early to midautumn. After this, the quality of the plants left in the ground depends entirely on the weather. In dry, mild weather they can stand in good condition well into midwinter, but in harsh or wet weather the plants deteriorate rapidly and may not last beyond late autumn. For this reason, it is well worth covering them in midautumn to protect the plants and extend the harvesting season.

Chinese cabbage is usually lifted whole and taken straight into the kitchen. It is at its crisp and tasty best right after cutting and does not store well. It is also possible to take off a few leaves at a time, leaving the plants in the ground.

There are several varieties of Chinese cabbage available to the home grower. Bok Choy is crisp, with very white stems and fleshy leaves. Wong Bok has heads 10 in (25 cm) tall, 6 in (15 cm) thick, which are completely blanched. It can be harvested about 10 weeks after sowing. Michihli, with its dark green outer leaves and well-blanched inner leaves, forms tall, tapering heads, about 18 in (45 cm) tall and 3–4 in (7.5–10 cm) thick. Pe-Tsai is a tall, early variety with crisp, light green leaves. Pac-Choy is a mustard (loose-leaf) type, and resembles spinach when cooked.

Hybrids of Chinese cabbage have also been developed. The Burpee hybrid is similar to Wong Bok, with round heads, 13 in (33 cm) tall and 8 in (20 cm) thick. The Wonder Cross F_1 hybrid is another variety, forming a loose head, and often successful where other varieties fail.

Use Chinese cabbage in the same way as lettuce or cabbage, slicing it up diagonally. The outer leaves and stems make delicious cooked greens, and they have an advantage over other cabbages in that they leave no strong cooking smell. The crisp inner hearts make excellent salads. And, of course, this is a perfect vegetable to use in Chinese cooking.

growing ideas

Nuts for the Holiday Table

A bowl of nuts is a delicious treat at holiday time —or at any other time—and with nut trees in your garden, you can enjoy nuts at their best.

Raising your own nuts is not a difficult task; you may already have a nut tree in your garden. Nuts are not fussy about the soil and are excellent for filling a corner of the garden, or for adding a useful and ornamental touch to your lawn. Nut trees tend to be erratic croppers and they are not really suited to the smallest gardens, but with some luck and a little care you should be able to harvest small crops of delicious hazelnuts (filberts) and walnuts.

Nut trees are suitable for planting on poor, stony soils where most fruit trees will not thrive. Very rich soils are unsuitable, for the growth will be lush and unproductive. They are quite unparticular trees and will tolerate both sunny and shady sites, as well as wide extremes of soil acidity and alkalinity. The only thing to avoid is a heavy, wet clay-based soil. Although hazel blossoms are frost tolerant, the nutlets can be killed by frost, and cold may also delay the opening of the female flowers long enough to prevent pollination. Walnut flowers are very frost susceptible, and so also are their young shoots and leaves.

Hazelnuts (*Corylus avellana*) are grown as open-centered bushes raised from suckers detached in the autumn, or from layers of whippy growths positioned near ground level. You can also buy young plants from nurseries.

If you are planting a new bush, mix in a light dressing of rotted farmyard manure or garden compost a few weeks before planting, which can be any time from midautumn to early spring where winters are mild; spring only in cold climates. After planting, tread the soil firmly around the bush. In late spring, apply a mulch of well-rotted garden compost, leafmold or peat; feed with sulfate of ammonia at the rate of 2 oz per sq yd (60 g per sq m) in early spring. This mulching and feeding should be repeated every two years or so. In addition, each year in midautumn, dress with sulfate of potash at the rate of ½–1 oz per sq yd (15–30 g per sq m). If your soil is very rich, you can omit feeding. A mature bush already in your garden will also benefit from this treatment, as well as from pruning.

Nuts will be easier to pick if you restrict the bushes to a height of 6 ft (1.8 m). Pull out all suckers, and cut out any inward-growing, dead or weak shoots. Late winter is the best time for this pruning; shorten the leading shoots by half of their previous year's growth at the same time. To promote a succession of your twiggy fruiting shoots, cut back completely about half of these, choosing the shorter ones. The longer ones can then be left to fruit. Pruning in late winter insures that you can see which are the fruitful shoots. Hazelnuts which are already established in your garden will

George Hyde

←*Ripe fruit of the walnut tree ready for picking in autumn. To gather nuts for storing, wait until they begin to fall naturally. Dehusk and dry the nuts before storing in a cool place.*

probably need their top growth thinned considerably. Aim to have the center of the bush open and clear of crossing and crowded shoots; cut out weak, dead and diseased shoots and, finally, remove about half of the remaining twiggy sideshoots completely.

Bushes may not produce a full crop until they are about six years old. A dry day in early to midautumn is the best day to harvest your nuts—provided you do not have to compete with the squirrels. The husks should be yellowing, and the nuts brown but not quite detachable from the husk. After picking, allow them to dry thoroughly before storing them with salt or dry sand in airtight jars or cans.

There are, in fact, several varieties of hazelnuts, but you are unlikely to find more than one or two offered.

Hazelnuts are subject to certain pests and diseases. The larvae of the nut weevil can be a serious problem, so control by spraying with rotenone or malathion in spring or early summer.

A walnut tree (*Julglans regia*) is a more expensive investment than hazelnuts but one which is long-lived and an ornamental addition to any garden.

Walnuts are also tolerant of wide variations in soil conditions, although they have a slight preference for neutral soils. Extremes of dryness or wetness are not very satisfactory either, but almost anything else will produce a good tree. An open, sunny position is ideal, and the site should be frost-free, as the young shoots are quite susceptible to frost damage. Walnut trees can reach a height of 50 ft (15 m) or more, so be sure to allow sufficient space.

Trees for planting can be purchased from certain nurseries. Planting should be in early spring in most parts of the country; dig in a complete fertilizer before planting. As with hazelnuts, never add much rich organic matter or growth will be lush and unproductive. Walnut trees are planted like any other standard fruit tree; compact the soil around the roots and stake and tie securely. After the soil has warmed up in spring, mulch to retain moisture. Thereafter, give an annual dressing of bonemeal at 2 oz per sq yd (60 g per sq m), applied in spring.

George Hyde

▲ *Young, green hazelnuts in fall; gather when the nuts turn brown and hard.*

Walnut trees need only a minimum of pruning, mostly to help young trees grow into an attractive shape. Prune in midsummer, as bleeding will be less then. With older trees, pruning is removing dead wood or awkward branches.

Do not expect to gather nuts from your newly planted tree for quite a long time, as walnuts may take many years to begin cropping, and your crops will not be very heavy for several years after that. It is advisable to wear gloves when gathering nuts, as they can leave a long-lasting stain on the hands. If you plan to pickle some walnuts, gather them when the shells are soft enough to pierce with a needle, usually in midsummer. Most walnuts are gathered for eating raw, or for storing. Wait until they start to fall naturally in early to midautumn, and the husks open easily. Dehusk the nuts, dry them thoroughly, and store them in salt.

Walnut trees are sometimes attacked by the grubs of several moths. These pests tunnel up through the trunk, weakening the tree and allowing fungus diseases to enter. If you see the grubs, kill them by poking wire through the tunnel, or by inserting a few crystals of paradichlorobenzene and sealing the hole with putty. Squirrels have a great liking for the walnuts, so try to gather the nuts before they get to them. You can also fit aluminum collars around the trunks to prevent them from climbing up. However, if you live near a wooded area, resign yourself to the idea of sharing your nuts with squirrels.

Onions

Allium cepa (fam. *Amaryllidaceae*)
Hardy biennial cultivated as an **annual**
Sowing to harvesting time: 12–16 weeks for bulb onions; 8–11 weeks for spring or bunching onions; 10–14 weeks for pickling onions; 16 weeks for shallots
Size: average bulb diameter 2–4 in (5–10 cm), although much larger ones can be grown; plants grow to 20 in (50 cm) high; bunching onions about ⅜ in (1 cm) or less in diameter and 6–8 in (15–20 cm) high; shallot bulbs ¾–2 in (2–5 cm) diameter, plants grow to 12 in (30 cm) high
Yield: bulb onions 20 bulbs, each about 4 oz (125 g) per 10 ft (3 m) row; shallots 25–30 plants, each bearing about 8 oz (250 g) of bulbs per 10 ft (3 m) row; bunching onions about 60 onions per 3 ft (90 cm) row

Onions are among the most regularly used of all vegetables, and they are well worth growing at home. Unlike many crops there is little possibility of waste—most onions store so well that whatever you grow you can eventually use up. Another major advantage for many home growers is that an onion crop can be grown on the same site for years, but it can also fit well into a crop rotation, providing a break from brassicas, peas, beans or potatoes.

Onions do best in an open sunny site. The onion grower is rather at the mercy of the weather, in that a period of drought when the bulbs are forming can result in a very disappointing crop. If you can keep watering regularly during a drought this is fine. But if the bulbs reach a point when they get really dry and growth stops, then a sudden drenching can be disastrous, causing distorted growth, split bulbs and thick "necks." So, one of the key points to remember is to pull the crop as soon as possible once growth has stopped.

Main types of large onions
The original species of onion has split into several types. Of interest to the gardener are: a spring-sown maincrop, harvested in autumn; onion "sets," small bulbs planted in spring for quick growth; the hybrids, which include many of the newer varieties, are much more vigorous growers, larger and often better keepers and more disease-free; an autumn-sown crop, harvested as bulbs in warm areas.

Preparing the soil
Onions need a firm, loamy soil, although good crops can be obtained on any suitably prepared ground. The land must be well drained. Onions prefer a light soil to a heavy one, and it is a good idea to correct any acidity to about pH 6 by appli-

GROWING ONIONS FROM SEED

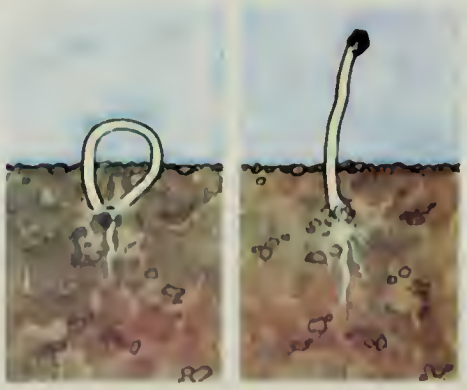
1. After manuring in autumn, work in 1 oz per sq yd (30 g per sq m) of fertilizer in spring sowing.

2. Immediately before sowing, rake the seedbed to a very fine tilth; make the surface as level as possible.

3. Tread down the soil to firm it, but not when it is sticky. Heavy soil needs only a very light firming.

4. Draw drills ½ in (1.3 cm) deep and 1–1½ ft (30–45 cm) apart. Sow seed quite thickly, then barely cover and firm.

5. Sowings under glass or plastic may be made up to 8 weeks earlier than those in the open; warm soil first.



6. The tip of the onion seedling feeds from the seed at first. Do not disturb it; it will soon straighten (right).

CARE AND CULTIVATION

7. To control onion fly, apply bands of insecticide granules between drills; do not thin if the soil is dry.

8. Thin the young plants in two stages to a final distance of 6 in (15 cm) apart; use thinnings for salads.

9. Water regularly during the growing season to avoid any check in growth, which can produce inferior bulbs.

10. Weed regularly by hand close to plants to avoid loosening soil around roots; elsewhere hoe carefully.

11. In late summer, when leaves are yellow and dying, bend them over to expose bulbs to light and air.

12. Harvest by lifting bulbs carefully with a fork; remember that Japanese varieties must be used immediately.

cations of lime at a rate based on the result of a soil test.

For the best results, dig an organic plant food (farmyard manure or a good quality garden compost) into the soil several months before sowing (e.g., in autumn for beds where you will be sowing in spring). A barrow-load of manure or compost for every 9 sq yd (7 sq m) should be sufficient. A complete fertilizer may also be applied just before sowing at the rate of 1 oz per sq yd (30 g per sq m) and worked well into the soil. All types of onion need a firm, compact seedbed of fine soil. Rake the ground before sowing and tread well to firm it.

The spring-sown maincrop

Sow outdoors as early in spring as soil conditions will permit. The soil should be moist but not wet; if soil does not stick to your shoes but still feels damp then it is ready for sowing. Sow the seed in drills ½ in (1.3 cm) deep and 1–1½ ft (30–45 cm) apart, and sow fairly thickly—about 10–20 seeds per 1 ft (30 cm) row—because the thinnings can be used as salad onions. The period from sowing to germination, on average, is 14–21 days. Thin the young plants in two stages, the first to about 2 in (5 cm) apart, and then to about 6 in (15 cm) apart.

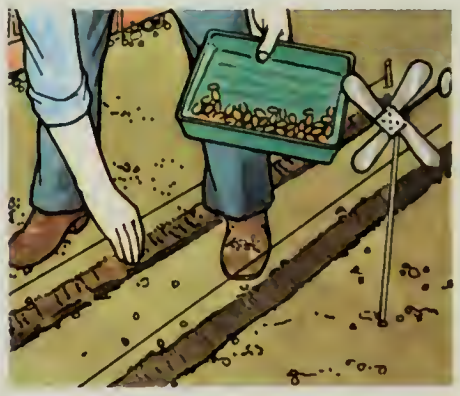
As with most vegetables, an advantage can be gained in spring by sowing under covers. These sowings can be made up to eight weeks earlier than those in the open. The extra weeks are particularly useful with onions, as the plants need a long growing period, so that bulbs sown under covers tend to be larger. Remove the covers when all danger of frost is past.

You can also get a head start by sowing in late winter in a cold frame. Sow as you would for growing under protective covers and harden off for planting out in midspring.

Onions sown under covers or in frames have two other advantages over later-sown crops. In the first place, they grow quickly and make much of their growth while the soil is still moist from the winter rain and snow, thus avoiding

GROWING ONIONS FROM SETS

1. Before planting onion sets, cut off old leaves that would attract the birds after planting.



2. By midspring, plant sets 6 in (15 cm) apart in shallow drills 1 ft (30 cm) apart, with "necks" uppermost.

3. Have a look at the sets a week or two after planting; press back into the soil any that have moved.

Clay Perry Marshall Cavendish

▲ *A fine crop of onions, with their tops bent over to hasten ripening.*

a severe check at a critical stage during a summer drought. They are also sufficiently well grown to resist attacks of the onion fly, which is active in late spring and summer.

Growing onions from sets

Many gardeners achieve a flying start by planting onion "sets." These are small onion bulbs which have had their growth arrested in the previous autumn. In the past, gardeners avoided onion sets because they tended to bolt and run to seed. Today, however, sets are carefully treated and stored, and they are often easier to grow and keep than varieties raised from seed, particularly in areas when the summers are cool and wet. Buy only certified sets from a reputable seed merchant.

Most onion sets are imported from subtropical zones for planting in temperate climates in midspring. Plant them in rows 1 ft (30 cm) apart with the bulbs 6 in (15 cm) apart in each row. Set them in the soil with the "neck" at the top just visible above the surface.

Like onions sown under protective covers, onions grown from sets enjoy the advantage of making much of their growth while the soil is still moist and of being sufficiently well grown to resist onion fly attacks.

Sowing the hybrids

Sow in late summer, where they are available, for the maincrop but sow slightly more thickly. When grown successfully, these varieties should fill the gap between using the last stored onions from the previous year's spring sowing and the availability of the new crop next autumn. Japanese onions have not been fully tested in all climatic zones, al-

though they are widely available in Britain and have proved successful in most areas there.

Autumn sowing

Sowing onions in autumn outdoors gives the same results as sowing in spring under protective covers or planting onion sets. The bulbs from autumn sowings should be ready for harvesting a month or so earlier than those from a spring sowing. But autumn sowings are worthwhile only if your area is fairly warm, and the site chosen should be quite sheltered.

The seed should be sown in early autumn to give the plants enough time to attain a reasonable size—about 6 in (15 cm) in height—before the onset of winter frosts. Sow as you would for the spring maincrop, but a bit more thickly to allow for casualties. Onions are hardy but not completely so, and a severe winter will cause damage. It is important to select the correct varieties, bred for autumn sowing. Onion plants bought from nurseries for transplanting in spring should also be of the autumn varieties.

Care during growth

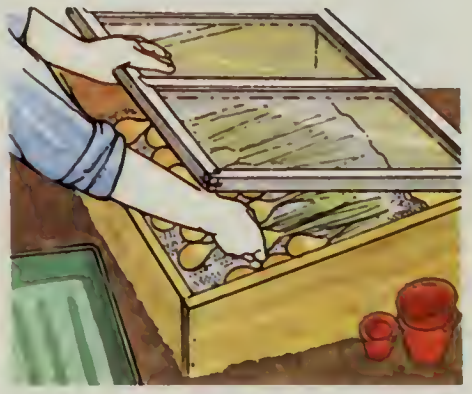
Because onions produce tall, thin, hollow leaves, they are particularly susceptible to weed competition. Hoe the soil frequently but shallowly to avoid loosening the compact soil around the onion roots or damaging the bulbs. Hand-weeding, which does not damage the roots, will almost certainly be necessary. A convenient mulch will help to control the weeds, but it should not cover the tops of the bulbs.

Onions should be watered well and regularly throughout the growing season to avoid any check in growth, which can result in bulges in the bulbs, in thick necks and thin bulbs, or in splitting.

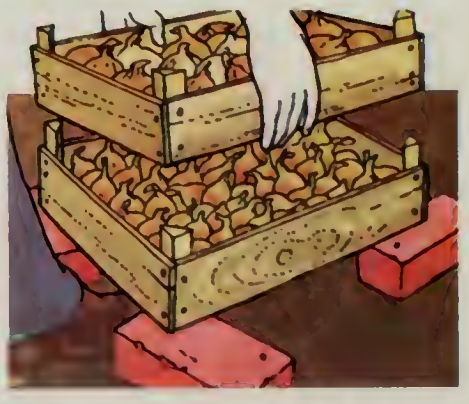
Examine onion sets a week or two after planting, as they tend to rise out of the soil and may "travel" several inches (centimeters) from the place where they were planted. If this has happened, press the sets back into the soil. They can also be pulled out of the ground by birds.

RIPENING AND STORING ONIONS

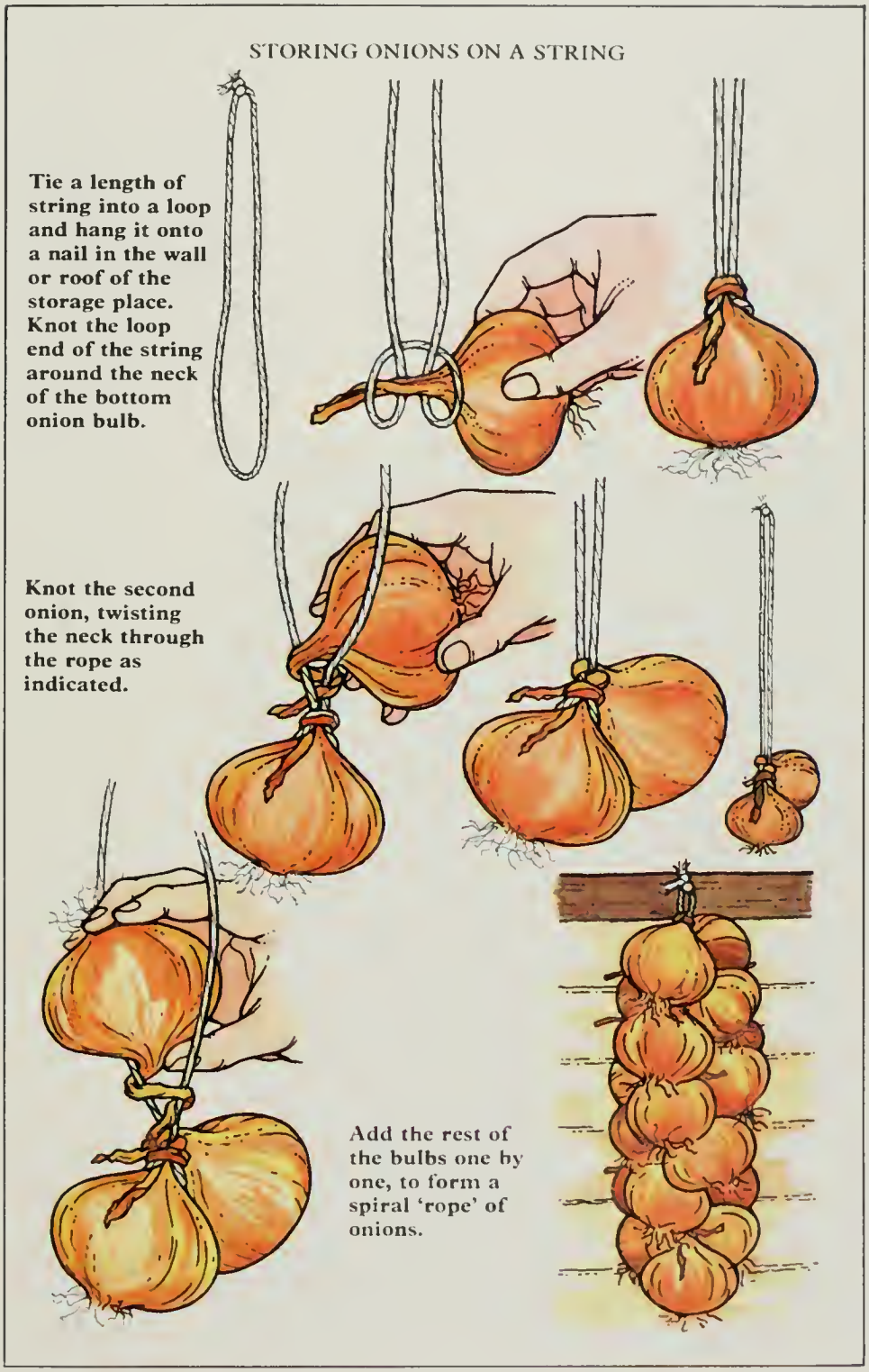
1. If the ground is wet at harvesting time, ripen bulbs by placing them on a platform raised from the ground.



2. If it is raining at harvesting time, ripen bulbs in a cold frame, as shown here, or move them into a shed.



3. You can store ripe, thoroughly dry bulbs in trays with slatted bases in an airy, dry, frost-proof place.


STORING ONIONS ON A STRING
Tie a length of string into a loop and hang it onto a nail in the wall or roof of the storage place. Knot the loop end of the string around the neck of the bottom onion bulb.
Knot the second onion, twisting the neck through the rope as indicated.
Add the rest of the bulbs one by one, to form a spiral 'rope' of onions.

During the growing period onions need a lot of nourishment. Feed the plants with either liquid manure at regular intervals until midsummer, or hoed-in applications of a nitrogenous fertilizer, such as nitrate of soda, at the rate of about 1 oz per 3 sq yd (30 g per 3 sq m) in late spring or early summer.

When the bulbs are ripening, as indicated by the yellowing and dying back of the leaves, discontinue any watering or feeding. In dry weather the leaves will bend over naturally but, if the summer is wet and this has not happened, bend over the tops to prevent any further growth and thus to hasten the ripening process. It may take weeks for large bulbs to ripen.

Harvesting the crop

Bulb onions will be ready for harvesting throughout the summer and autumn, according to the time of sowing. The earliest are the new early hybrids which should mature mid- to late summer. Some are for immediate use; most other varieties can be used at once or can be stored. Very large onions do not store as well or as long as smaller bulbs, so use the large ones first.

Clay Perry, Marshall Cavendish

←Onions can be hung on a wall outdoors if the weather is warm and dry, but take them indoors at the first sign of dampness or of frost.

A dry day is best for harvesting onions. Lift them gently with a fork or pull them by hand and, in dry weather, lay the bulbs flat on the ground or on sacking. Turn them now and again to be sure of even ripening. The onions are ready for storing when they are thoroughly dry with brittle, papery leaves. In a wet season, the drying process will take longer and you should lift the onions onto a platform raised above the ground, allowing the circulation of air beneath it. A tray of small-mesh wire netting is ideal. This can be moved into a shed if wet weather persists.

Storing the crop

Bulb onions are normally grown for storing and use in autumn and winter. Onions in storage will start to produce green shoots and, if allowed to, flower heads in the following spring, so only keep them for a limited time and check them for signs of decay or growth.

Bulbs for storing should be perfectly healthy and quite dry. Discard any that are not. Probably the best method of storing is the traditional "string" of onions: tie each bulb to a length of rope suspended from the roof of a shed or garage, arranging them spirally around the rope. Alternatively, onions can be stored on trays of wire netting, suspended in rope or nylon nets, or placed on wooden shelves, although it is best to have air circulating all around the bulbs. The place in which they spend the winter must be dry, airy and frostproof.

Aftercare

The onion is among the most economical of plants in its production of foliage. By the time the bulb has ripened there is very little left of other parts of the plant. Consign any dead leaves to the compost heap if they are free from pests and disease; otherwise, burn them.

Salad and pickling onions

Spring bunching onions, also known as scallions, can be sown in autumn, spring or summer, for pulling when young and green to be used raw in salads.

Spring onions are sown in the same soil and conditions as for the maincrop. Pickling onions prefer a light, thin soil. Make the drills a bit wider than those for the larger varieties, and sow the seed very thickly. Both are quick-growing, maturing in eight weeks or more.

Exhibition tips

Sow the seed in midwinter in a greenhouse heated to 55°F (13°C) so that the bulbs will be fully ripe in time for the early autumn shows. Sow the seeds 1 in (2.5 cm) apart in 3 in (7.5 cm) deep seed boxes filled to within 1 in (2.5 cm) of the top. Use a light soil mixture with a small amount of sharp sand added. Cover the seeds with no more than ¼ in (6 mm) of the mix and sand combination, and keep the light out by covering the boxes with glass and newspaper until the seeds germinate.

Then remove the paper and prop up the glass. Remove the glass altogether after a few days and place the boxes near the light. Keep the mixture quite moist. When the seedlings have four leaves, transplant them individually into 3½ in (9 cm) pots and move them to an unheated frame in early spring. If necessary, support the plants with slender canes.

After hardening, set out the plants into their permanent bed in mid- to late spring, spacing them 1 ft (30 cm) apart in rows 1 ft (30 cm) apart. Choose only those plants that have firm green leaves and white unbroken roots.

After this, cultivate as normal, although you can give more nitrogenous food (as dilute liquid manure) and a light dressing of potash in midsummer. Just before you are ready to lift the bulbs remove a little of the soil from around the neck, also any loose outer skin, so that the bulbs get plenty of sun and develop the best possible color.

A few days before harvesting, loosen the roots by partly lifting the bulbs carefully with a fork. After harvesting, when the necks should be limp, place the bulbs in a slightly shaded part of the greenhouse or a sunny room to ripen.

Harry Smith

▲ White Sweet Spanish, sown indoors in early spring. Sown late, they are strong.

Pat Brindley

▲ Red Wethersfield is a very heavy yielder that becomes flat at maturity.

Sutton Seeds Ltd

▲ Yellow Bermuda has mild, white flesh. Popular, it is medium-sized and flat.

Pat Brindley

▲ Hybrid Yellow Sweet Spanish is larger and more vigorous than the regular strain.

Varieties

This is a guide to the basic characteristics of some of the most popular varieties of onion. Your local garden center or nursery will probably feature a selection of these which are most likely to suit the climate and soil in your area. Other key points to remember are whether you want a strong or mild flavor, and for how long you will want to store your crop of onions. They are roughly divided as follows:

Maincrop onions

Ailsa Craig: 100 days. Most popular large exhibition onion abroad; of limited availability in the United States

Autumn Spice: 92 days. Good for muck soils and short seasons; a good keeper.

Pat Brindley

▲ *Stuttgarter, grown from sets, is ideal where onions are difficult to grow from seed.*

Unwins Ltd.

▲ *A long-established spring onion variety, White Lisbon, has a good, mild flavor.*

Harry Smith

▲ *Evergreen White Bunching does not form bulbs. Winters over with protection.*

Sutton Seeds Ltd Torquay

▲ *A most popular pickling onion, Silver Queen grows quickly and ripens early.*

Burgundy: 95 days. Mild, sweet, red; especially suited for hamburgers, salad.
Crystal Wax Bermuda: 95 days. Mild, early, trouble-free; excellent for South.
Downing Yellow Globe: 110 days. One of best keeping; heavy yielder in gardens.
Patti King: 95 days. Mild, bun-sized; can be harvested early but keeps well.
Super Spice: 97 days. Large, improved Autumn Spice; heavy yielder in North.
Red Wethersfield: 100 days. Very heavy yielder, white fleshed; large, flat, mild. A good keeper.
Ringmaster: 110 days. Large, mild globes; good keeper. Ideal for frying, salads.
Spartan Sleeper: 110 days. Very long keeper (12–18 months), resists fusarium.
Storage King: 96 days. Vigorous, resists fusarium, a good keeper; for heavy soil.

Yellow Bermuda: 95 days. White-fleshed, very mild; flat, medium-sized, early.
Yellow Globe Danvers: 105 days. An old reliable, white-fleshed, good keeper. Also used for sets.

Onions from sets
Golden Mosque: 105 days. Combines advantages of Stuttgarter, earliness of Ebeneezer.
Stuttgarter: 120 days. For light soils; resists seeding, yellow, sets keep well.
White Ebeneezer: 100 days. Keeps well; like White Portugal when mature.
Yellow Ebeneezer: 100 days. Popular early; keeps well. Mid-sized flat globe.

Pickling type
Barletta: 70 days. Soft, mild; earliest white pickling/cocktail sort.
Silver Queen: 80 days. Early, matures fast; round, clear white.
White Portugal: 100 days. Mild; late.

Sweet Spanish varieties
Chieftain: 115 days. Hard, larger than Fiesta; keeps well. Replaces El Capitan.
Fiesta: 110 days. Coppery globe; keeps and cooks well. Best for light soils.
Gringo: 105 days. Early, sweet; resists splitting.
Riverside Sweet Spanish: 115 days. Heavy yielder, large; resists thrips, blight.
White Sweet Spanish: 115 days. Good fryer; single centered. Up to 1 lb (½ kg).

Spring or bunching (scallions)
Beltsville Bunching: 65 days. Crisp, mild, slim; best for summer heat.
Early Mild Bunching: 60 days. Long and white; sweet, mild. For early summer.
Evergreen White: 120 days. Sow spring, summer for over winter; can pick early.
Hardy White (Japanese) Bunching: 70 days. Plant for summer use or wintering over.
White Lisbon: 60 days. Very early, vigorous, mild; an old favorite.
White Sweet Spanish: 75 days. Can be used as buncher for hottest part of summer.

Sutton Seeds Ltd Torquay

▲ *Much grown for exhibition, Ailsa Craig is a very large onion variety with a mild flavor.*

Brian Turner

▲ *Yellow Globe Danvers is a heavy cropper with exceptionally good keeping qualities.*

Pests & Diseases

Onion fly: the most troublesome pest is the onion fly, which resembles a small, gray housefly. It lays its eggs in spring and early summer, on the neck of the bulb, on the leaves and in the nearby soil. When the larvae hatch, from late spring onward, they tunnel into the plant tissues. Control them by scattering insecticide granules in late spring.

Older plants can be attacked, but young onions are particularly susceptible and, if onion fly is prevalent, it may be as well to stop pulling young plants for salad. Lift and burn any affected plants as soon as you see the symptoms of yellowing, drooping foliage, and be sure not to leave any maggots in the ground. Take care not to leave thinnings lying around or to damage roots or leaves.

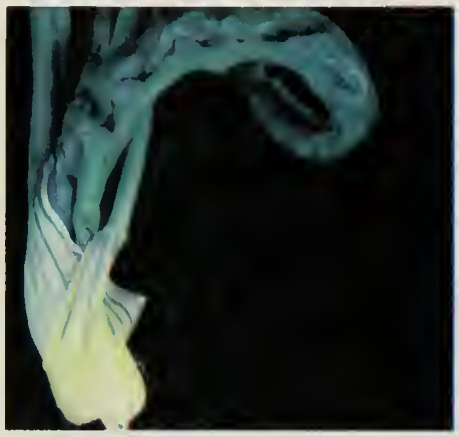
The flies are attracted to freshly manured beds, so be sure to dig in organic matter several weeks before sowing. Very early sowing will insure that thinning is done before the onion fly is about to attack the plants. Autumn-sown plants are less likely to be attacked.

Eelworm: eelworms are minute parasites which are invisible to the naked eye. Stem and bulb eelworms may affect onions, causing distorted leaves and swollen bases. There is no fully effective chemical control, and an attack is normally a sign of neglect of proper crop rotation and a lack of garden hygiene, allowing the pest to build up to dangerous levels. Chickweed can be affected by the same eelworm, so it is important to keep the bed weed-free. Burn any infected plants and make sure that you grow onions in a different place in the garden in the future. After a serious outbreak, it is best to refrain from growing onions in any part of the garden for at least two years. Autumn-sown plants are less likely to be attacked.

White rot: white rot sometimes builds up in the bunching onions in hot, dry sum-

A Shell Photograph

▲ *Section of an onion with severe onion fly damage, clearly showing the white larvae.*



Murphy Chemical Ltd.

▲ *The effects of eelworm. An infestation is usually due to neglecting crop rotation.*

GUIDE TO ONION TROUBLES

Symptoms	*Probable causes*
Yellowing, drooping leaves	Onion fly White rot
Leaves dying back from the tips	Downy mildew
Distorted, misshapen leaves	Eelworm
Black, sooty spots on leaves or bulbs	Smut Smudge
White mold on bulbs	White rot
Bulbs rotting in storage	Soft rot Neck rot

Murphy Chemical Ltd.

▲ *Neck rot may affect bulbs in storage. Avoid damp, stuffy conditions.*

National Vegetable Research Station, Wellesbourne

▲ *White rot damage showing fungus on bulb bases and yellowing leaves.*

mers. The leaves become yellow and the bases of the bulbs become covered with a white or gray fungus. It can be combated by dusting the soil at sowing time with chemicals, but the best control is to keep onions away from any affected plot for at least eight years. Plants grown on fertile, organically manured soil are less susceptible to the disease, and some varieties of onions are more resistant than others. The variety White Lisbon, on the other hand, is particularly susceptible to the disease.

Downy mildew: also called onion mildew, a fungus disease which occurs in cool, wet weather. The fungus causes the leaves to die back from the tips and shrivel. Burn diseased plants and do not grow onions on the site for a year as the disease spores can remain in the soil. Some varieties are more resistant than others.

Neck rot: this seed-borne fungus disease only reveals itself when the onions are stored—by then it is too late. The preventative treatment is to give onion seeds and sets a dusting of fungicide before planting. Keep your storage place cool and well ventilated and dry the bulbs thoroughly. Never store damaged onions or those with green fleshy necks.

Soft rot: another disease resulting from improper storage, causes the bulbs to become glassy and rot into a soft mass. Again, to prevent this follow instructions for proper storage.

Smudge: smudge is a minor fungus disease which is seen as black smudges on the outer scales of the onions. As it does not usually cause major damage, no special treatment is necessary, other than proper harvesting and careful storage.

Smut: this fungus disease shows as sooty spots and patches on the leaves and bulbs, and it can kill seedlings. Fortunately it is not common. There is no chemical control; rest the soil as long as possible, destroy the affected plants as soon as you see them, and be extremely careful not to spread the contaminated soil about the garden to insure against any further attacks. Only young plants are infected.

Gray mold: autumn-sown onions are susceptible to gray mold, which can be recognized by white spots on the leaves. Eventually the leaves die back from the tips. A spraying of captan or colloidal sulfur in early spring can help to prevent this.

Yellow dwarf and shallot virus yellows: yellow dwarf results in stunted stems and yellow-streaked leaves. It occurs mainly in the United States, while the very similar disease shallot virus yellows—which only occasionally attacks onions—is found in Britain. Shallot virus yellows is spread by aphids. Can be controlled by spraying with derris or pyrethrum.

growing ideas

Oranges in Pots

Bring a touch of subtropical sunshine into your house and garden with a simple, container-grown orange tree.

The orange is an ideal subject for pot cultivation: the tree can spend its summers in the garden and its winters indoors. Contrary to popular belief, orange trees do not need excessively high temperatures to thrive, although they do not like very cold weather. A tree will be bearing fruit well when it is about five years old, if you treat it kindly. A pot-grown specimen has a useful life of thirty to forty years. Oranges are evergreen and very ornamental with glossy dark leaves, waxy white flowers with a beautiful scent produced usually in late winter and fruit which is ready early the following winter. An advantage of growing one in a pot is that this keeps the tree small by restricting its roots.

Many good nurseries will be able to supply you with a suitable tree. These are sold when two or three years old and usually are budded onto rootstocks of various types. An orange tree is fairly expensive but its long life justifies the initial outlay.

On the whole oranges need too much light to be grown successfully as house plants so should winter in a heated conservatory or greenhouse. An exception, however, is the calamondin, a dwarf variety which fruits when only 2 ft (60 cm) high or less. The fruit is tiny—about the size of a walnut—and it can be preserved in syrup and used in drinks.

If you have a greenhouse or conservatory your choice of variety is wider. The sweet orange is the most hardy. It makes a round-topped tree with regularly arranged branches and slender spines. The navel and the blood orange are both types of sweet orange. The fruit used for making orange marmalade is that of the Seville, or bitter, orange. This makes a similar tree to the sweet orange.

Trees are often supplied in plastic containers, and these may be left a few days before planting if they are watered. Trees with bare roots must be soaked for an hour or so and then planted quickly.

Choose a container with drainage holes and put a layer of broken clay pots at the bottom for drainage. Fill with a good potting mixture or equal parts by volume of loam, sharp sand, peat, leaf-

Repotting in fresh soil

Kim Sayer Clifton Nurseries

←A dwarf variety of orange, the calamondin, which makes a very successful house plant, producing fruit when the tree is only 2 ft (60 cm) tall or less.

mold or manure. Add to this 1 oz (30 g) of bonemeal, or ½ oz (15 g) if you have used manure.

Use the smallest pot that will take the roots of the new tree. When three years old you may transplant it into a 10 in (25 cm) pot and three years later into a larger one. Continue doing this until a maximum pot size of 2 ft (60 cm) is reached. Repot the tree at the end of each winter even if there is no need for a change in pot size. Water the tree, then lay the pot on its side. Do not disturb the soil mix around the roots, but remove all the rest and replace with new. Prune any long root which is curling around the pot at the same time to two-thirds its length.

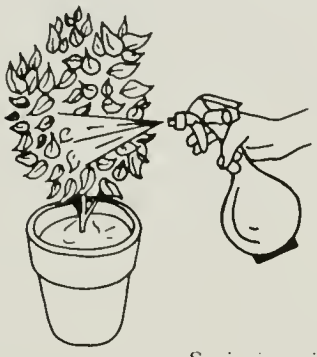
It is a good idea to use a tub with casters for the final container: soil is heavy and a wheeled tub is easier to maneuver than an ordinary one. When the tree has been moved into this last pot or tub, abandon repotting. Instead remove top layer of soil each year and replace it with fresh. Mulch the tree annually in summer with rotted manure or give it a feed of a balanced fertilizer.

If you do not replace the top layer of soil each year or overwater your plant you will need to give it another application of manure or fertilizer at the beginning of the growing season. Sometimes oranges suffer from a deficiency disease, often the lack of iron. You can recognize iron deficiency by yellowing of the leaves. Use an appropriate foliar feeder as a quick way of providing the plant with what it needs.

Oranges need light and a minimum temperature of about 45–50°F (7–10°C) and they like a moist atmosphere. Make sure you maintain this temperature in winter or the tree's growth will be retarded. No additional heating should be necessary in summer. From about midsummer until early autumn the tree can

be moved to a sheltered sunny spot in the garden.

Water the tree regularly in summer. In winter you can let it get almost dry, but do not allow the roots to dry out. Oranges benefit from syringing; syringe the leaves with clear water daily in warm weather and once a week in winter.



Syringing with water

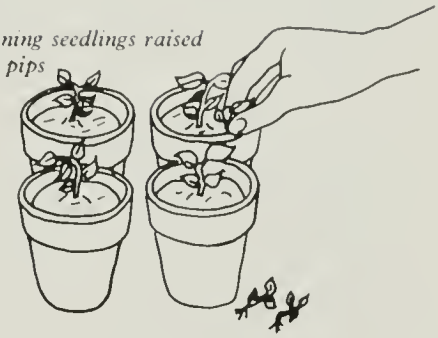
On warm days when the tree is still under glass, make sure that it is adequately ventilated.

The best fruit is that which reaches a good size before coloring. Fruit does not ripen all at once so picking extends over some weeks. Use shears for picking as fruit is easily damaged.

There are a number of troubles that might affect your orange tree. Canker is a bacterial disease affecting the bark and producing spots on the leaves. If this appears, seek help locally. In some countries it is subject to government regulations. Aphids, whitefly and scale insects sometimes infest orange trees. Scale insects have a brown or red "back" with eggs underneath like white cotton. They feed on the sap. Some types secrete honeydew and black mold grows on this. A white oil spray is usually efficient at clearing up the problem in the early stages and black mold can be washed off with soap and water.

It is quite possible to grow oranges—and, in fact, other citrus fruit—from seed. The seeds are mostly polyembryonic, which means that more than one plant may grow from each seed. Discard the least vigorous seedlings and

Thinning seedlings raised from pips



the selected ones should grow reasonably true to type.

In early spring, plant single seeds ½ in (1.3 cm) deep in sandy soil in 3 in (7.5 cm) pots. To germinate they need a temperature of 55–60°F (13–15°C).

Leave the seedlings for two years before transplanting into 4 in (10 cm) pots. In the fourth spring transplant once again into bigger pots.

The big disadvantage of rearing oranges from seed is that they are very slow to fruit—cropping may be delayed ten years. But trees raised in this way are hardy and cost practically nothing.

You can grow new trees from semiripe cuttings of new sideshoots 3–4 in (7.5–10 cm) long. Root them with the help of a mist propagator or a plastic tent and rooting hormone. They may take in less than a month but it could be eight months before they root. Pot the rooted plants and gradually harden off before taking them outside about a year later.

Cuttings are not likely to be as vigorous as plants budded from a nursery, or as those produced from seed, and they may be susceptible to diseases.

Little pruning is necessary on a bought tree, which will have been pruned to a good shape. Those grown from seed will need more attention. Pinch out their growing tips at three years old to keep them bushy. Cut out crowding and crossing branches as necessary to keep the tree reasonably open. Watershoots are very strong, quick-growing shoots which grow on the upper side of branches. Unless needed to fill a gap, remove these too when young or they will spoil the tree's shape.

Parsnips

Pastinaca sativa (fam. *Umbelliferae*)
Hardy biennial grown as an **annual**
Sowing to harvesting time: 17 weeks
Size: roots up to 1½ ft (45 cm) long
Yield: about 14 parsnips, each weighing on average ¾–1 lb (360–450 g) per 10 ft (3 m) row

Before the potato was introduced to Europe in the late sixteenth century, its place in European cooking was taken largely by the parsnip. Few vegetables are as easy to grow, as nutritious or as versatile. Parsnips are available as a fresh vegetable throughout the winter (where digging is possible), actually improving with the arrival of hard frosts. They can be baked, boiled or fried, while some people eat the leaves as a green vegetable, getting double value from their crop.

The problem with growing parsnips is that they have such a long growing season. They are among the first crops to be sown—as soon as the soil is workable in early spring—and then occupy the land for the rest of the year and are perhaps the last crop to be harvested. They can thus take up land which could be put to more profitable use growing a series of crops.

If you have a small garden you may decide against them for this reason—although you can raise a catch crop, such as radish or lettuce, before the parsnips are established in the spring. But if you have a fair piece of land, and especially if you do not have a lot of time, parsnips are an obvious choice. Avoid planting them near carrots or celery as all three are attacked by the same pests.

Suitable site and soil

Soil is the all-important factor in growing parsnips. Do not bother with them if you have a thin gravelly soil, as you will only get small, misshapen roots. The best soil is friable, rich and slightly on the heavy side, although it should not be recently manured as this tends to cause forking, as do stones.

Do not worry if your soil is not the best, however. Almost all well-drained soils will produce a good crop, although it is worthwhile to use land manured for a previous crop. Simply dig the soil about 4 in (10 cm) deeper than the length of your intended variety. Be sure to remove large stones. However, if your garden is very stony and removing all the stones is impractical, it may be worthwhile growing in boreholes as you would for exhibition parsnips.

Level the bed off, to give a fine tilth, a day or two before sowing—which will normally be as soon as conditions allow in the early spring. While you are preparing the bed, rake in a mixture of four parts by volume superphosphate, together with one part each of sulfate of

ammonia and sulfate of potash, at the rate of 3½ oz per sq yd (100 g per sq m).

Parsnips dislike very acid soil and do best in one which is slightly acid to neutral, so test the soil several weeks before preparing the seedbed. If necessary, add lime to achieve a pH of 6.5.

The site you choose for parsnips is not as important as the soil. They prefer an open, sunny site, but they will also grow quite happily in a lightly shaded plot.

Sowing

The traditional time to sow parsnips is late winter but, unless your winters are mild, the soil is often frozen hard or too wet at this time. Where winters are severe, you will probably have to wait until early spring before sowing. Although parsnips appreciate a long growing season, you can sow later still, up to late spring if you have to, and still get a worthwhile crop.

Sow the seed in a shallow V-shaped drill about ¾ in (2 cm) deep. Take the drill out using the edge of a hoe. If you are sowing more than one row, space the rows 12–18 in (30–45 cm) apart.

Parsnip seeds are fairly large—about ¼ in (a little under a centimeter) in diameter—but they are very thin and light. Sow three or four seeds at each station along the drill with about 6–9 in (15–23 cm) between the stations, depending on the size of your variety. It is a good idea to sow several seeds at each station because, although most of them will germinate, you will then have a good choice when thinning and can ensure that there is a really strong seedling in each position. The seed does not store very well, so always use it fresh.

Because the seed is so light, it is inadvisable to try to sow on a windy day; wait until the weather calms down. One way of making life easier is to use pelleted seed if this type of seed is available in your area. The pelleted seed is heavier so it will not blow away.

After the seeds have been sown in the drill, cover them with soil (sifted soil is best for this) and firm down. Water if the weather is dry.

SOIL PREPARATION

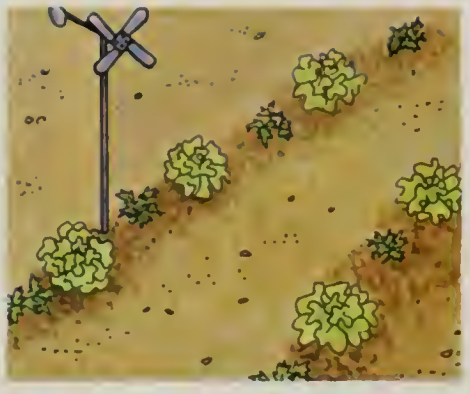
1. Dig the soil a little deeper than the length of your intended variety, making sure to remove all stones.

2. Test your soil and if it is very acid, apply lime as necessary to achieve a pH of 6.5—a more even acid-alkali balance.

3. Work the soil to a fine tilth and prepare drills 12–18 in (30–45 cm) apart and ¾ in (1.9 cm) deep.

SOWING AND CULTIVATION

1. Sow three or four seeds at each station, spacing them 6-9 in (15-23 cm) apart from each other.



2. It is a good idea to raise a catch crop of lettuce between the parsnips, to mark your rows.

3. Thin the seedlings when they are about 2 in (5 cm) tall, leaving only the strongest at each station.

4. Water if the weather is dry. This is especially important during the crop's early stages.

5. Hoe as necessary, taking care not to damage the shoulders of developing roots in any way.

Germination takes three to four weeks, and in this time it is quite easy for the row of parsnips to be lost among newly germinated weeds. Weed frequently and carefully. Many gardeners sow a quick-maturing catch crop, such as lettuce or radish, between the stations in the row. This not only gives you an extra crop but also helps to mark the row. If you do not wish to do this, leave your marking line in position until the seeds have germinated and the row of seedlings is obvious above the ground, so that there can be no unfortunate mistakes. Once the seedlings are up, a mulch helps to discourage weeds.

Marshall Cavendish Clay Perry

With correct cultivation, you can achieve a bumper crop like this one, ready for harvesting.

Care and cultivation

Once the parsnips are sown they need very little attention. When the seedlings are about 2 in (5 cm) tall, thin all but the strongest at each station. Do not be tempted to use the thinnings; parsnip seedlings do not produce good roots after the check produced by transplanting. Water, particularly during the early stages of the crop, if the weather is dry, and weed frequently. Be very careful when using a hoe to remove weeds that you do not damage the shoulders of the developing roots. If you do damage them, you may open the way for attack by canker. Fertilize your growing parsnip plants every six weeks or so.

Harvesting

Once the tops of parsnips turn yellow and begin to die back, they are ready for harvesting. Parsnips sown in early spring should be ready in midautumn, but do not rush to pull them all up. The flavor of parsnips is improved by frost, which increases the sugar content of the root, so leave most of them in the ground and dig some up when you want them during the winter, provided you use a heavy enough mulch to keep the ground unfrozen. Do not leave any in the ground after early spring, however, as then they will start to grow again and become woody and useless.

Small parsnips in light soil can be pulled up once the soil around them has

The forked, malformed parsnip (left) is the result of a stony soil. On the right, a well-grown specimen.

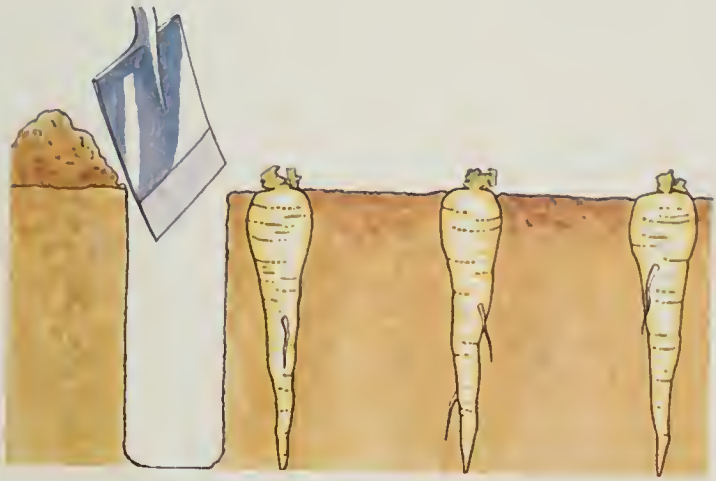
Eric Crichton

Fine looking, recently lifted parsnips, ready for kitchen or storing.

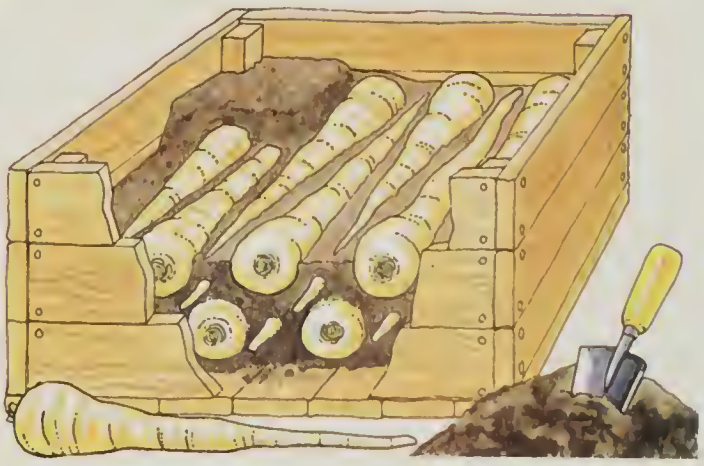
been loosened with a fork. Normally, however, the best way parsnips can be lifted without breaking them is by digging. Begin at the end of the row and dig a hole beyond, but close to, the last parsnip. Dig the hole as deep as the parsnip and loosen the soil around the root, which can be then easily removed without damage. Lift the next parsnip by moving the soil next to it into the hole from which the first parsnip has been taken and continue like this to the end of the row.

You will probably find you have to dig down much further than you expect. The end of a parsnip root tapers off for a considerable length, 6 in (15 cm) or more, and has a surprisingly strong grip on the soil. In fact, it will probably be necessary to break off the thinnest part of the root, if you want to avoid digging too sizable a hole for each root.

HARVESTING



Begin at the end of the row and dig a hole close to the first parsnip, making sure it is as deep as the length you expect the parsnip to be. Loosen the soil around the parsnip and you will then be able to lift it easily without damage. Lift the next parsnip by removing the soil next to it into the hole you made for the first one and continue like this down the row.



Although parsnips are best left in the ground, it is a good idea to store some for when frost makes lifting impossible. Store them in boxes, using layers of peat or dry sand.

Once the parsnips have been lifted, cut off any remaining leaves with a knife. The discarded tops are excellent compost heap material.

Storing

Although the best-flavored parsnips are those lifted and taken into the kitchen straight from the ground after some hard frosts, obviously you will not be able to do this when the ground is frozen hard in the middle of winter (unless you mulch heavily). To be sure you have parsnips during this period, therefore, you should dig up some roots in the early winter for storing.

Store the parsnips in the same way as you would carrots. Cut any leaves off close to the crowns and then pack the roots in layers of dry sand or peat in a large wooden box. Put a lid on the top to keep out the light and place the box in a cool, dry and airy place.

Exhibition tips

Exhibition parsnips should be long, straight and unforked. Grow a long variety and sow them as early as you can to get the longest possible growing season. Parsnips are unlikely to be ready for an early summer show but should be large enough for late shows.

If you have a first-class, deep, stone-free and friable loam you will probably be able to produce roots sufficiently good for showing by planting them in the normal way, perhaps just spacing them a little further apart, at 12 in (30 cm) intervals. If you are not so lucky, however, you will only be able to produce first-class parsnips by sowing in boreholes.

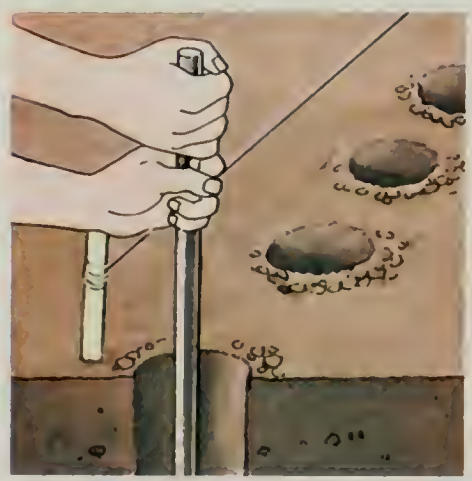
Use a long straight iron rod to make a conical hole about 3 ft (1 m) deep and about 6 in (15 cm) in diameter at the top. Drive the rod into the soil and work it in small circular movements to make the hole. Space the holes about 1 ft (30 cm) apart.

Fill the holes with a good, moist sandy potting soil which you have first put through a ½ in (1.3 cm) sieve. Firm this soil down and then sow in the normal way.

Keep the parsnips well-watered throughout the season to prevent cracking, and weed frequently. It is a good idea also to mulch with peat to retain moisture and to keep down weeds.

Harvest the parsnips as late as possible before the show. Be very careful not to

EXHIBITION GROWING



1. Using a long rod, make holes 1 ft (30 cm) apart, 3 ft (90 cm) deep and about 6 in (15 cm) wide at the top.

2. Almost fill the holes with sifted soil and sow 3–4 seeds in each. Cover to a depth of ¾ in (1.9 cm).

damage or scratch them when you dig them up. Use the hole method as previously explained.

The number of parsnips to exhibit is usually six. Pick large white straight roots, all of the same size. They should be well-developed with good shoulders and absolutely blemish-free.

After lifting, cut off the tops about 1 in (2.5 cm) from the shoulders and shave off all the root hairs with a sharp knife. Then sponge the roots very carefully, and wrap in wet sacking immediately to keep them fresh so that they look their best when you get to the show.

When you get to the show simply lay the parsnips carefully together on the bench in the form of a pyramid, with three roots at the bottom and one at the top. Adjust the roots so that they are close together with as little daylight between them as possible; turn them around so that any bulges on one root fit into a depression in its neighbor. If necessary, tie them together with a piece of soft string, preferably of the same color as the parsnips. If displayed in a simple manner like this, they will look even better than they are, without appearing over fussy.

3. Before the show, trim back leaf stalks to 1 in (2.5 cm) and cut off the rootlets with a sharp knife.

Varieties

All America: tapering white roots; early, large, broad-shouldered.

Harris Model: long, slim, tapering; commercial growers favor this sort for packing.

Hollow Crown Improved: an improved old favorite; short-topped with well-formed, smooth, wedge-shaped roots.

Large Sugar: very early, smooth; popular in South.

Other varieties

White Gem: white smooth skin; some resistance to canker.

Offenham: a broad-shouldered variety particularly suitable for clay or shallow soils; good, sweet flavor; heavy cropper.

The Student: thick tapering roots with excellent flavor; heavy cropper.

Avonresister, grown abroad.

Brian Furner

Brian Turner

▲ *All America*

Harry Smith

▲ *Hollow Crown Improved*

Harry Smith

▲ *Large Sugar*

Pat Brindley

▲ *Harris Model*

Avonresister: the shortest variety of all, producing small, conical roots; because it is so small, thin to only 3 in (7.5 cm) between plants in the rows; more resistant to canker than most other varieties.

Tender and True: clear smooth skin; resistant to canker.

Exhibition Long-rooted: clean, smooth root of fine flavor, a good choice for showing.

Lisbonnais: very good flavor; a large, well-shaped root; especially good for exhibiting. Popular abroad; similar to the American variety Large Sugar.

Pests & Diseases

Not much is likely to go wrong with your parsnip crop if it is well-grown as part of a crop rotation. Several diseases such as downy mildew and leaf spot may be unsightly but they do not seriously affect the yield of an otherwise healthy crop. Canker is the worst problem and good cultivation is the best defense.

Wireworm: gardens recently recovered from grassland or badly tended gardens suffer most from this troublesome pest. The shiny yellow larvae, which are about 1 in (2.5 cm) long, bore small regular holes in most root crops, including parsnips. Small roots may be almost entirely eaten up.

Keep wireworm down by careful weeding and cultivation. Treat very badly infested land with an approved soil control, and do not plant parsnips or other susceptible crops for four or five years.

Carrot rust fly: the greenish-black carrot rust fly lays its eggs in the soil near carrots, parsnips or celery to which it is attracted by the smell of the foliage. The eggs hatch to produce small, pale yellow maggots which invade the roots. These pests are also a problem because the wounds they cause provide a starting point for canker.

Carrot rust fly is most likely just after thinning because the smell of the damaged foliage of the thinned plants attracts them. Thin in the evening when the flies are less likely to be active, and burn all the thinned plants. Firm the soil around the plants after thinning as this fills in the cracks in the soil and deters the flies from laying eggs. Using a state-approved control, dust the furrows at planting time or water the rows with a solution as needed.

Aphids: in a dry summer, aphids can infest the foliage in large numbers, so that the leaves curl, become yellowish and even cease to grow. This is more likely to happen in dry weather if the plants have not been watered regularly. Pick off the worst affected leaves and spray the remainder with Sevin or rotenone.

Canker: this is the most serious problem with parsnips. It appears as firm brown or black patches on the shoulder of the root which then becomes soft and rotten. The secondary rotting which follows the initial discoloration is caused by fungi or bacteria, but the reason for the original discoloration is not known. It is most likely, however, that infected roots have been damaged in some way, perhaps by carrot rust fly, by cracking caused by heavy rain after drought, or by careless hoeing. Because parsnips are not self-healing (as potatoes are, for example), soil-borne fungi and bacteria can enter and rot the root.

Apparently, the best remedy is better cultivation. Acid soil and over-manuring with unrotted manure are thought to encourage canker and these should be avoided. Try, also, later-sown crops, as these are more resistant.

Virus: mottled yellow leaves and stunted plants are signs of parsnip virus. As with all viruses there is no cure. Pull up the affected plants and burn them.

Powdery mildew: parsnip leaves are occasionally attacked by this fungus which appears as a fine white powder on the

Murphy Chemical

▲ *In some countries, maggots of the celery fly burrow into the leaves, causing blisters.*

Ministry of Agriculture, Fisheries & Food

▲ *Patches on the shoulder of the root, which then becomes soft, indicates canker.*

Ministry of Agriculture, Fisheries & Food

▲ *Mottled yellow leaves and stunted plants are signs of parsnip virus.*

surface of the leaves. It is most widespread in damp years but even then it does not seriously affect the growth of the plants, and can be ignored.

Downy mildew: downy mildew appears as moist, dark brown or black spots on the leaves but, again, it is not serious.

Leaf spot: a third disease which attacks parsnip leaves is leaf spot which produces small brown spots on the leaves. Again, do not worry. The disease does not do enough damage to merit control measures.

Sclerotina rot: this disease only attacks roots in storage, the roots becoming covered with a fluffy, white mold. To prevent rot, only store in a dry, airy place and do not store damaged roots.

Celery fly: prevalent abroad, this pest is not as serious on parsnips as it is on celery, but it can still do sufficient damage to reduce growth appreciably, because its attacks interfere with the chlorophyll-making mechanism of the leaves. The tiny ¼ in (6 mm) adult flies lay eggs on the foliage and the small maggots which emerge burrow into and through the leaves, producing white or brownish blisters as they go. Normally, good cultivation will enable the plants to grow back after attack, but in the worst cases the most badly affected leaves should be removed and the remainder sprayed with malathion.

GUIDE TO PARSNIP TROUBLES

Symptoms	*Probable cause*
Small regular holes in the root	Wireworm
Irregular holes in the root sometimes with small whitish grubs inside	Carrot rust fly
Leaves curling, slightly discolored, yellowish, and small	Aphids
Reddish brown, dark brown or black patches on the shoulders of the root	Canker
Mottled yellow leaves and markedly stunted growth	Virus
Fine white powder on the surface of the leaves	Powdery mildew
Moist dark brown or black spots on the leaves	Downy mildew
Small brown spots on the leaves	Leaf spot
Roots in storage rotten and covered with a white fluffy mold	Sclerotina rot
White or pale brown blisters on the leaves, leaves shriveled	Celery fly

step-by-step growing guide

Peaches

Prunus persica (fam. *Rosaceae*)
Hardy deciduous tree, with a useful life of up to 10–15 years
Planting to harvesting time: 2–3 years, depending on age of tree when planted
Size: 16 × 16 ft (5 × 5 m) fan-trained 8 × 16 ft (2.4 × 5 m)
Yield: 50 lb (22 kg) for a fan, 80–100 lb (36–45 kg) or more for a regular tree

The most delectable of stone fruit, peaches are well worth the extra care needed to grow them successfully. The juicy, yellow- or white-fleshed fruit has soft felted skin, often with a crimson tinge. In temperate climates peaches are harvested outdoors from midsummer onward. Peaches grown in a greenhouse will be ready for picking earlier. Besides the fruit, peach trees are in themselves a valuable addition to any garden, however small. The pale or rosy pink flowers are a welcome sight in early spring, and the dark green shiny leaves are very attractive through spring and summer.

The home grower can produce higher quality peaches than those available in the stores. This is because peaches are easily bruised, and ripe peaches do not travel well; commercially, peaches are harvested while still hard and unripe. In the stores the fruit may soften a bit, but they will never ripen properly under these conditions, and the full flavor is not developed. If you have a peach tree in your garden, however, you can leave the fruit on the tree until the last possible moment, and pick it when it is at its best.

Nectarines are a sport (naturally occurring variant) of peaches. Because they are so closely related, nectarine trees are occasionally grown from peach stones, and vice versa. Unlike the peach, which has felted skin, the red or yellow nectarine skin is smooth and shiny. Nectarines tend to be smaller and more brightly colored than peaches, with more highly flavored flesh. Like peaches, nectarines eventually make small trees. Except for the fact that they are less hardy than peaches, cultivation of nectarines is exactly the same as for peaches.

Originally natives of China, peaches are widely grown in most areas of the United States, especially Georgia and California. Certain varieties do better in the Northern and Central States, others in the South and Southwest, and still others can be cultivated only in the Gulf states. To do well, peaches need plenty

Donald Smith

▲ *A fan-trained peach with a full crop. The plastic net will catch falling fruit.*

of sunshine and protection from wind in early spring. This is because they flower early in the year, and sheltered conditions may be necessary for the blossoms to be successfully pollinated. In summer, they need even more sun, for the fruit to ripen fully, and in autumn warm, dry weather for the new wood to ripen. A period of cold weather in the winter allows the trees to rest, as well as killing off various pests and diseases. Water requirements can be tricky. If there is not enough water available, the fruit may not set or swell properly. Too much water, on the other hand, will kill the tree, and in parts of the world with a high rainfall, it is sometimes a practice to cover over the roots of a peach tree with brick or paving stones to cut down the moisture content of the soil. Planting a peach tree against a wall with overhanging eaves also cuts the amount of water reaching the roots.

Do not be put off by these seemingly stringent requirements; peaches do extremely well in most parts of the country. In the most favorable areas, peaches can be grown as bushes in the open. In cool climates, they are sometimes fan-trained against a wall facing south or southwest. The wall creates a warmer microclimate by retaining the heat of the sun; it also keeps excess rain off and gives wind protection where that is needed. Peaches

Pat Brindley

▲ *A well-grown dwarf tree with a fine crop of ripe fruit. These need more room but less pruning than fan-trained trees.*

grown in this way flower and fruit earlier than those grown in the open.

You can grow peach trees from stones (pits), but this will invariably take much longer than buying a tree from your nursery or garden center. Furthermore, a peach tree raised from seed will not necessarily have the good qualities of the parent tree. It may be a weak grower, a shy cropper or be of poor quality and years will be wasted before this is known. It is a safer bet to buy a named variety from a reputable merchant.

Suitable site and soil

Because peaches flower early in the season, especially wall-grown trees, they are particularly vulnerable to spring frosts. Peaches will not crop successfully when grown in frost pockets, or wind-swept, exposed sites. Peaches are eminently suitable, though, for training against south- or southwest-facing walls, where they are sheltered from wind but exposed to as much sunlight as possible.

Peaches cannot tolerate badly drained soil; a peach tree planted in waterlogged soil will not survive. If your soil is a really bad, heavy clay, you can correct the situation by digging out the existing unsatisfactory soil and replacing it with suitable loam. A drain should be put at the bottom of the pit to draw off surplus water to lower ground.

The ideal soil for peaches is a medium, well-drained, limy loam, not less than 2 ft (60 cm) deep, though they are moderately tolerant of a wider range of soils. Thin soils over limestone are not suitable, though, and in these conditions peaches may develop chlorosis (leaf yellowing). The root system must not be allowed to dry out or be exposed to frost, and remember that the roots should always be spread out to their fullest extent. No tree or bush fruit will ever be successful if planted with the roots cramped together. A fan may be planted close to a wire fence, but it should be planted 9 in (23 cm) away from a wall and inclined toward it.

Preparation and planting

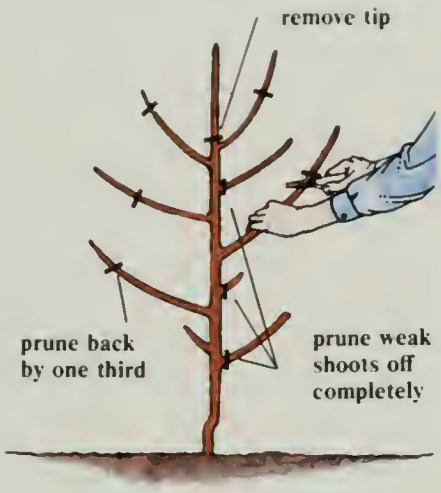
Soil preparation should take place a month or two before planting to allow the added organic matter time to be absorbed into the existing soil. For planting a tree in open ground, dig thoroughly and deeply over an area of 2 sq yd (2 sq m), and at the same time mix in one barrowload of rotted garden compost or manure. About a week before planting, fork into the top 9 in (23 cm), 4 oz (120 g) of a balanced fertilizer.

If you are planting near a wall, a month before planting excavate a hole $6 \times 3 \times 2\frac{1}{2}$ ft ($180 \times 90 \times 75$ cm) deep. Where soil drainage is poor, lay a tile drain 3 ft (1 m) deep and cover it with a layer 4 or 5 in (10 or 12.5 cm) deep of gravel, pebbles or similar drainage materials. If your soil tends to be noticeably acid, add one part by volume of old lime, broken bricks and sand to 10 parts of returning soil. This helps improve the drainage, and lime from the mortar is slowly released into the soil. Fork in fertilizer as for open-grown trees. Because peaches are vigorous by nature, do not overfertilize the soil. This would only result in lush, sappy wood and leaf growth at the expense of cropping.

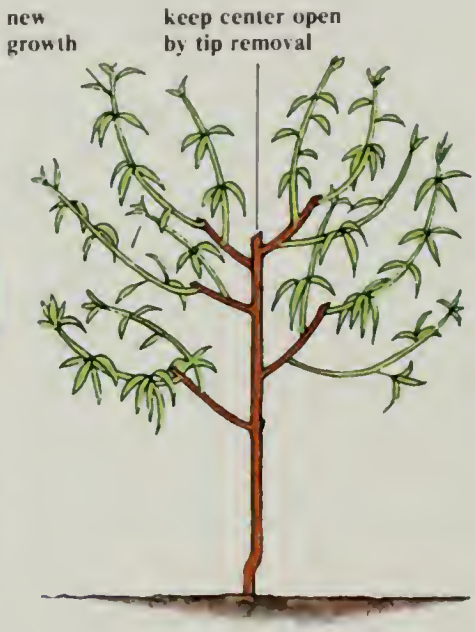
Except in the areas where winters are mild, spring is the best planting time. Peaches start growth early in the spring, so do not leave it later than this. Fall planting is possible in the South.

PRUNING A FREE-STANDING TREE

Having planted a young tree, prune like an apple; cut back strong branches by a third to an outward-pointing bud; remove tip, and cut back to main stem all weak shoots.



Newly planted tree



The following summer

Conventional training and pruning

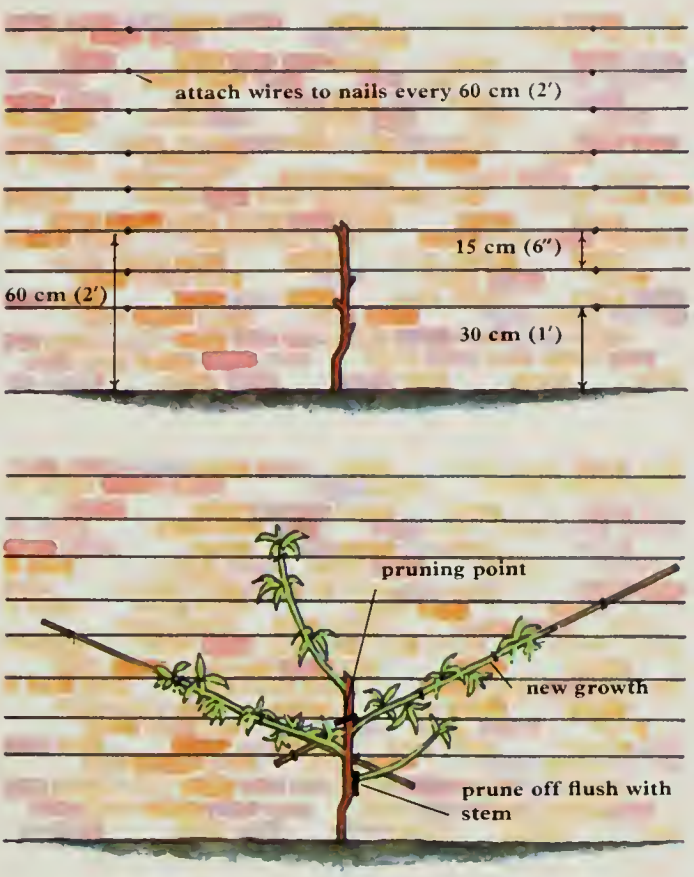
There are several advantages in growing peaches as standard or dwarf trees. Primarily, such trees require much less pruning than fan-trained trees, and no deshooting is required. This is because peach trees, when grown in the open, tend to produce less vegetative growth. Fan-trained trees crop more intensively and produce more fruit for their size. Being small, the latter are also relatively easy to spray, net and pick.

The pruning of a one- or two-year-old peach tree is the same as for an apple, except that a peach should have more branches in the center. Once the tree is fully trained and there is a sufficient framework of branches, the general aim in pruning is to provide a continual supply of new wood, on which the following year's peaches will be carried. All necessary pruning should be carried out before growth starts in the spring. Cut out any winter dieback to a healthy bud, and cut out branches which are growing weakly. If several buds part way down a branch have died, cut the branch back hard, to a healthy bud near the base of the branch. Do not prune any branches which are healthy and strong growing. As far as possible, avoid making large pruning cuts because of the risk of disease, and paint over any unavoidable large wounds with protective sealer.

The branches of established peach trees may eventually begin to droop. You should have a good supply of young, upright branches in the center of the tree, which can be trained to replace the older drooping ones. Either saw off the older branches completely, or cut them back to a suitably placed vertical shoot.

Training a fan

You will need a fence or wall 8 ft (2.4 m) high and at least 15 ft (4.5 m) wide. Wire the wall horizontally with ⅛ in (3 mm) gauge wire at a spacing of 6–8 (15–20 cm) apart. The central leader of the fan



FAN-TRAINING

1. In early spring of first year, when buds start to break, cut tree back to 2 ft (60 cm) above ground; leave at least two other buds for left and right branches.

2. The following summer, select two opposite sideshoots for primary left and right branches. Rub out all other growths on main stem and cut back central leaders to just above the higher branch. When they are 18 in (45 cm) long, tie sideshoots to bamboo canes with soft string. Fix canes at 45° angle to the ground.

will be pruned out, and the fan built up from two opposite diagonal branches.

If you wish to train a fan, buy a one-year-old tree, plant it and cut it back to about 2 ft (60 cm) above the ground to a healthy bud. Make sure that there are at least two good buds below this, as the first branches of the fan will grow from these buds.

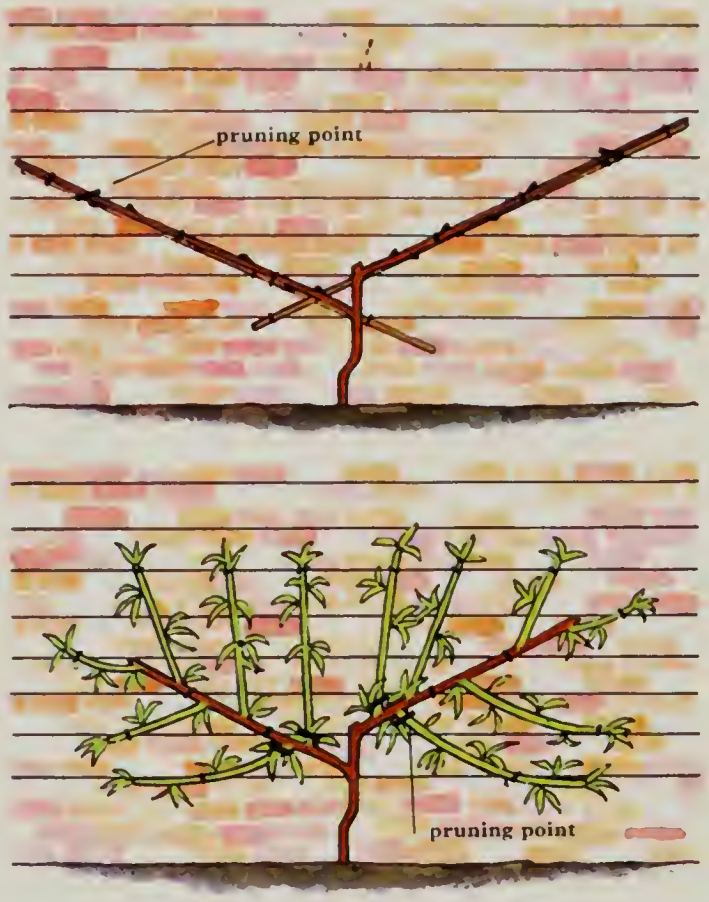
In the first summer, when shoots have grown out from the dormant winter buds, select two healthy ones opposite each other to make your primary left and right branches. These should be 12–15 in (30–38 cm) above the ground. Rub out all other growth on the main stem. When the sideshoots are about 18 in (45 cm) long, tie them to two long bamboo canes with soft string, and tie the canes to the wires at an angle of 45° to the ground, so that they are at an angle of 90° to each other. At this time, the main stem should be carefully cut out immediately above the upper of the two shoots, and the wound made smooth.

If one shoot grows more strongly, it should be temporarily lowered, by lowering the bamboo cane. This will slow the flow of sap and growth rate, until the other has caught up with it. In late winter, the two side branches are then shortened to a bud 1–1½ ft (30–45 cm) from the main stem. During the following summer a shoot will grow from each of these buds, and will eventually be tied in. New sideshoots will grow along the length of the branches. Select two on the upper side of each branch, and one on the bottom, and tie them to the wires to form the framework of the tree. Prune out all other shoots.

FAN-TRAINING

3. After the second winter, prune when buds start to break; cut the two side branches to a bud 12–18 in (30–45 cm) from the main stem.

4. In the second summer, select two vertical shoots on upper side of each branch and one on the underside; cut back all others to the base. Tie them to the wires to form framework of the tree.



In early spring after the third winter the tree has spent in your garden, cut back these eight branches to a triple bud (consisting of flower and growth buds), leaving 1–1½ ft (30–45 cm) of ripened wood. If the area is large, and the framework does not yet fill its allotted space, you can continue this summer and winter schedule for another year; otherwise pruning is adjusted to stimulate fruit production.

Pruning established fan trees

Because the peach flowers only on wood made in the previous year, wood which has fruited is frequently useless as far as future cropping is concerned. After sideshoots have cropped, cut out the old fruit-bearing laterals back to replacement shoots. Fruit-bearing laterals can be kept, however, if there is still space to be filled out; they then become part of the tree's framework, on which new fruit-bearing sideshoots will grow.

After cutting out unwanted laterals, tie in the new growth and renew any ties where constriction is taking place. Cut out all dead or diseased wood at this time, and shoots growing directly toward or away from the wall. The fan should present a neat, flat appearance, well secured against winter.

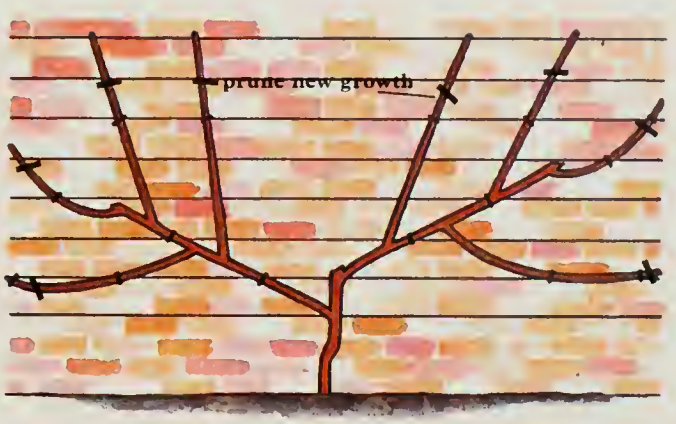
When the tree has filled its allotted space, prune the leaders like a sideshoot, back to a replacement shoot.

Rubbing out

At blossom time, or just after the flowers fade, deal with the newly produced shoots; at this time they will be about ½ in (1.3 cm) in length. Rub out altogether those growing directly toward the wall.

FAN-TRAINING

5. In late winter of third year, prune back the eight branches to a triple bud (flower and growth buds), leaving 12–18 (30–45 cm) of ripened wood.



Those growing away from the wall should be pinched back to one leaf.

Now turn to the blossom-bearing side-shoots which grew last year. There will nearly always be a new shoot growing near the base of a blossom-bearing shoot, or nearby, and this new shoot is left to grow on as a replacement. The end bud on the fruiting shoot is allowed to produce a shoot. All the new shoots in between the terminal and the basal shoot are rubbed out, except any produced at the same point as the blossom. Stop these at one leaf. Do this in three stages at intervals of about ten days, to avoid shocking the tree. It is a good idea to start at the top of the tree and gradually work downward.

Pinching back and tying in

Tie in the young shoots in spring and summer while they are still flexible. They must not overlap but should radiate out like the spokes of a wheel. Check that the shoots carrying fruit are securely tied. Pinch back the replacement shoot to six leaves, and stop the new shoot at the end of the fruit-bearing branch in the same way. At the center of the framework where the branches converge, young shoots should be pinched back to about six leaves.

Feeding, watering and pollination

Because peach trees need to make a lot of vegetative growth to crop well, they need plenty of nitrogen. Generous feeding is necessary; overgenerous feeding, however, will lead to lush, sappy growth and reduced crop yields. For a tree growing under normal conditions in moderately good soil, top-dress each spring with a balanced or complete fertilizer, at the rate of 3 oz per sq yd (90 g per sq m). At the same time give a light mulch of rotted manure or garden compost. Once the fruit has started to swell, give a liquid feeding every seven to ten days; stop the feeding when the fruit begins to color.

The soil at the base of a wall can become very dry, particularly in midsummer. Prolonged lack of water may cause poor fruit set and excessive fruitlet drop, so water the soil thoroughly during dry weather. This is particularly important at blossom time and when the stone is developing. Finally, avoid growing anything in the soil under the peach tree which would compete with the tree for moisture or nutrients.

Most peaches are self-fertile, but crops are more assured if you hand pollinate. If necessary, gently brush the flowers when fully opened with a soft camelhair brush tied on the end of a bamboo cane, to assist pollination. The chances of successful pollination are improved when you mist the flowers with lukewarm water on sunny days.

Because peaches flower early in the season, some protection against frost may be necessary. If frost threatens while the flower buds are opening, cover

FAN-TRAINING

6. Unless wall to be covered is very large, after third year pruning should aim to stimulate fruit production; make sure branches are evenly spaced and not overcrowded.

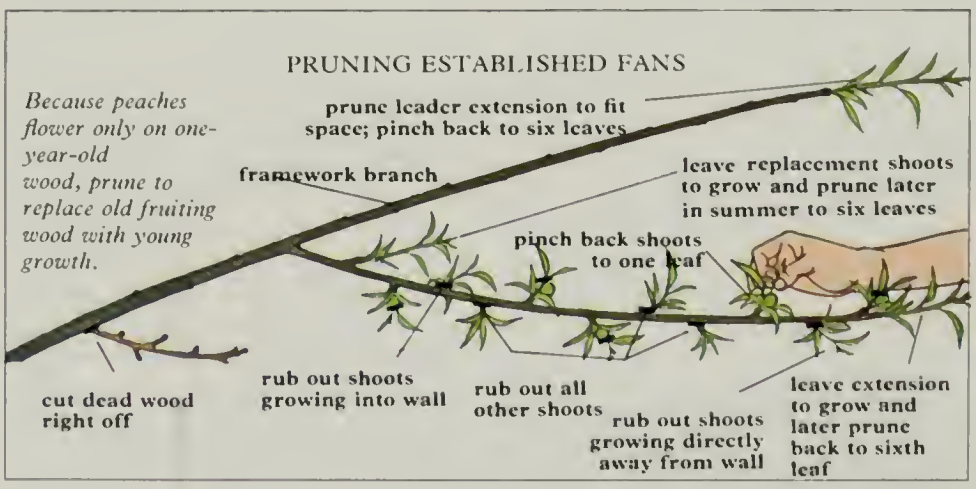
the tree with garden netting or cheesecloth. Be sure to remove the cover whenever the temperature rises above freezing, or the trees will not receive the fullest exposure to sunlight and insects will not be able to visit the flowers.

Peaches under glass

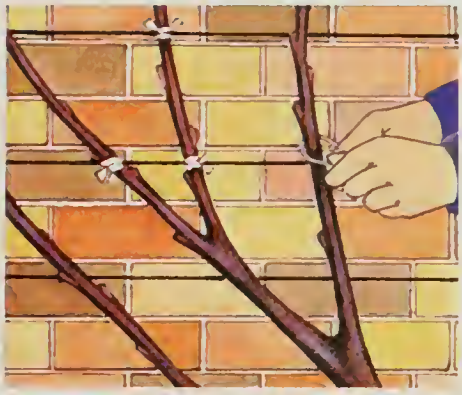
In years past, it was common for the larger estates to grow early peaches in greenhouses, and today's home gardeners can still do it. Protection from frost, sudden weather changes, many pests and diseases are the benefits of greenhouse growing. Against this must be put the fact that more time must be devoted to cultivating peaches under glass, and it is unlikely that the greenhouse can be used for growing other fruits or vegetables at the same time.

Vigorous control of the tree size is necessary for peaches grown in a greenhouse. A fairly common mistake is to plant two peach trees in a greenhouse where there is only space for one fully grown peach tree; eventually both trees will need severe pruning and their productivity will then be diminished. Although a newly planted peach tree may look somewhat small relative to the size of the greenhouse, remember that it will ultimately need about 12 ft (3.6 m) of wall space.

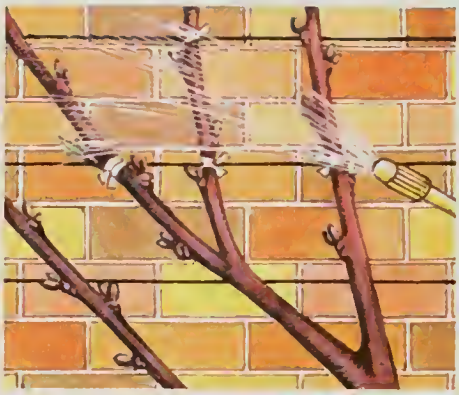
The greenhouse need not be heated; if heat is available, the season can be extended by forcing early crops and by growing late varieties which would not normally ripen fully outdoors. Heated or unheated, to comfortably accommodate a single peach tree the greenhouse


PRUNING ESTABLISHED FANS
Because peaches flower only on one-year-old wood, prune to replace old fruiting wood with young growth.
prune leader extension to fit space; pinch back to six leaves
framework branch
leave replacement shoots to grow and prune later in summer to six leaves
pinch back shoots to one leaf
cut dead wood right off
rub out shoots growing into wall
rub out all other shoots
rub out shoots growing directly away from wall
leave extension to grow and later prune back to sixth leaf

CULTIVATION AND CARE



1. Check ties regularly to make sure growth is not constricted; use soft string, as this does not harm shoots.



2. If you have trouble with aphids, spray the tree at bud-break in spring with an approved material.

3. Top-dress each spring with a balanced compound fertilizer, at the rate of 3 oz per sq yd (90 g per sq m).

4. For successful cropping, hand pollinate by brushing fully open flowers with a soft camel hair brush.

should be at least 12 ft (3.6 m) long and 7½ ft (2.3 m) to the ridge. A lean-to should be the same length and ideally slightly higher at 8½ ft (2.6 m) with a wall facing the midday sun. The fan is trained to follow the sloping roof line in a span house. A series of parallel, horizontal wires are fixed against the wall and roof, about 15 in (38 cm) away from the glass. The first wire is 18 in (45 cm) off the ground, and the rest are spaced 8 in (20 cm) apart. In a lean-to, the fan is grown against the back wall. Here, the only heat will be that of the sun, and the advantages of growing peaches in an enclosed greenhouse will be lessened.

The soil in the greenhouse should be well prepared before planting; prepare as for growing a tree outdoors against a wall. If it is a small greenhouse, the roots can be allowed to grow under the walls and into the soil adjacent to the greenhouse. Remember, though, that in time the roots will become very thick and large, and may damage the foundation of the greenhouse. If the roots are to be contained within the greenhouse border, it is doubly important that there is sufficient depth and area for the roots to grow, and enough slow acting nutrients to support growth and fruiting. Pay particular attention to drainage, as soil in a

confined area can quickly go "sour" if waterlogged, damaging the tree roots in the process. If the soil is at all heavy, it is a good idea to improve drainage by raising the soil in the greenhouse, with an open-jointed brick retaining wall. There should be 3 ft (90 cm) of soil depth, in total, so the brick retaining wall can be from 6–30 in (15–75 cm) high, depending on the amount of extra drainage needed. Excess water will drain through the open vertical joints in the wall, indicating when the soil is saturated.

Take care in watering, feeding, pollination and ventilation. The amounts of water given will vary according to the season and the stage of development of the particular tree. As a general guideline, 2 gal of water per sq yd (10 L per sq m) should be enough for two months in the winter; the same amount will last about three weeks in spring, and two weeks in summer. Remember that this is only a general guideline; if the summer is very hot and the leaves begin to wilt, apply water more frequently; if it is a particularly cold or late season, apply less. Whenever you do water, water thoroughly; never just dampen the surface of the soil. Syringe the trees when the flower buds begin to swell, and again when the flowers fade. Continue syringing until the fruit begins to ripen and then stop. Once the fruit has been harvested, syringe again until leaf-fall in autumn. Syringing also keeps down the risk of red spider mite infestation. In very warm weather, damp down the entire greenhouse, in order to create a moist atmosphere.

Although bees and other insects may enter the greenhouse through open vents and some self-pollination may occur, it is best to hand-pollinate the flowers. Atmosphere in the greenhouse should never be close or stagnant, so the ventilators should be open whenever possible. This is particularly important from late summer onward, as maximum light and ventilation allows the new wood to ripen.

After cropping, the fan should be untied from the training wires, and subsequently retied, with the lower shoots at least 3 in (7.5 cm) apart at their tips. In winter, the glass should be cleaned, both inside and out, and the wall whitewashed. Scrub down all woodwork, and apply a dormant oil spray to kill any aphids or scale insects. Take away the top 1 in (2.5 cm) of border soil, and replace it with a fresh dressing of loam, to which bonemeal and sulfate of potash is added.

Care of the fruit

Overcropping, or premature cropping, will result in small fruit and may reduce the following year's crop. If a peach tree is overcropped year after year, it will be permanently weakened and probably short-lived. Remove all the flowers from a young tree the first season after it has been planted, so the tree will channel its resources into the production of strong healthy wood. The first year it carries crops, thin the fruitlets so that no more than five or six peaches develop fully.

Once a tree is mature and cropping normally, thinning will be essential for wall, fan-trained trees. It is usually done in two stages over a period of a few weeks, so that the tree is not shocked. Start thinning when the peaches are about the size of peas, but wait until the natural fruit-fall is over before completing the task. The first thinning consists of reducing all pairs of fruit to singles, removing all undersized and badly placed fruit. Do not thin drastically at this stage, because a natural fruit-fall halfway through early summer will reduce the number of fruitlets. At about this time the fruit will apparently stop growing; it will be "stoning" and when this has finished the fruit will start to grow again. Unstoned fruits will drop. The second thinning, which is done about a month after the first and after the natural fruit-fall, consists of spacing the fruit to a final distance apart of 1 ft (30 cm).

Drape a 1 in (2.5 cm) nylon mesh net over the ripening fruit to protect them if birds are a particular problem. If wasps are troublesome, each fruit can be enclosed in a paper bag or old nylon stocking. If you use plastic bags, they should

be perforated, so the air can circulate around the fruit.

Early varieties start to ripen in early summer and cropping can continue, according to variety, as long as is desirable. Fruit is ripe when the flesh feels soft to finger pressure at the stalk end; a ripe peach should come away from the tree easily, without any pulling.

Exhibition tips

For exhibition work, peaches and nectarines are classified together. Begin preparations well before the show date, while the fruit is still on the tree. Although six is a customary number shown, you should have double that amount to take with you to the show, in case you need them.

As the selected peaches start ripening, tie back more and more of the overhanging leaves, so the peaches are gradually exposed to the maximum amount of sunlight. You can tilt the peaches slightly toward the light by propping them up from behind with small squares of wood or cardboard. If you have trouble with birds damaging the fruit, either net the tree or protect the selected peaches in individual perforated plastic bags.

Pick the peaches as near to the show time as possible, and handle them gently and carefully, so the bloom is not damaged. Peaches are shown without branch wood, although for convenience and ease in handling they can be picked with a bit of branch wood attached. Stage them on a plate, with the stalk end at the bottom and the eye uppermost. Place one fruit in the middle of the plate and arrange the other five around it.

Preserving

Peaches can be home-canned, after peeling, pitting and slicing, in glass jars or tin cans. They also can be processed into jams and marmalades. Halves and slices can be frozen, too—in a water pack if no sweetening is desired, but quality is better when packed in syrup or sugar. Be sure to label and date all preserved foods.

Pests & Diseases

Red spider mite: this insect, although most troublesome when peaches are grown under glass, is also found out of doors. The tiny mites can appear from midspring onward. They live and feed on the leaf undersides. Infested leaves look speckled and grayish, and eventually they may even wither and die. The spider mites sometimes cover the leaves and stems with pale webs.

This pest can be very difficult to control because some strains have developed a resistance to commonly used insecticides, especially those containing phosphorus. Malathion, rotenone or other sprays in midspring give some measure of control, but respraying may be necessary later in the season. If the problem is in the greenhouse, it is possible to take preventive action by maintaining a higher humidity, and making sure the trees never run short of water. The mites thrive under hot, dry conditions. If an infestation does appear there, you can fumigate regularly. Be careful not to rely too heavily on one type of insecticide, though, as this can be counter-productive in the long run. If the insecticide you are using seems to be getting gradually less effective, change to another.

Aphids: there are many varieties of aphids which attack peach trees; the most damaging in some countries is the peach aphid. The aphids feed on the leaves and shoot tips, which then become curled and stunted because the sap has been sucked out. A winter dormant oil spray should get rid of the hibernating eggs. Alternatively, spray the trees with lime-sulfur solution at bud break to control hibernating aphids.

Scale insects: like red spider mites, scale insects can cause damage both in the greenhouse and outdoors. One of the first signs of infestation is the appearance of stickiness and a sootlike substance covering the leaves. The latter is sooty mold, which grows on the honeydew secreted by the young scale insects. Small,

generally brown scales, sometimes also gray or black, can usually be seen if you look closely at the leaves and stems. These scales, which are roughly round to oval shape or cottony, depending on species, protect the female insect and also the eggs.

Control a bad infestation of scale insects with a dormant oil spray. Should any appear in spite of the spraying, spray with malathion as soon as you see them, but not at flowering time.

Birds: birds can be very damaging; both the dormant buds in winter and ripening fruit are vulnerable. Although scarecrows and bird-repellent sprays may offer temporary protection, the most effective long term protection is netting the trees with 1 in (2.5 cm) square nylon netting. It is initially an expensive outlay, but nylon does not rot and can be used indefinitely.

Leaf curl: this fungal disease, sometimes called peach leaf blister, is a serious disease affecting peaches in some areas. Infected leaves become curled, swollen, distorted, and red in color. As the spores develop on the surface of the blisters, they are eventually covered with a white bloom. It appears on the leaves soon after they unfold in spring, and they fall prematurely, though new leaves may be produced to replace them. Trees infected every year can eventually be killed.

To prevent leaf curl, spray the trees with a fungicide approved by your local state authorities just before the buds start to swell, and again in about two weeks, just as the leaves are unfolding. Remove and destroy all infected leaves. An additional spray in midautumn, just before or as the leaves begin to fall, is also advisable. These sprays are protective; the fungus spores hibernate on the buds, and the fungicide is intended to cover the developing growth before the spores can grow into it.

Split stone: this is a physiological disorder; the symptoms of split stone are cracking at the stalk end, and a rotten kernel inside a split stone in the center of the fruit. The crack at the stalk end is particularly damaging because through it pests, such as earwigs, and fungal infections can enter and attack the fruit. Poor pollination, poor soil, or excessive feeding after stoning has started can result in split stone. The main cause, however, is thought to be an irregular supply of soil moisture. The best precaution against this disorder is to be sure that the initial soil preparation is done carefully, and the trees are properly cultivated with

Royal Horticultural Society

▲ *Red spider mites feed on undersides of leaves, which wither and die prematurely.*

▲ *Peach leaf curl: to control this serious disease, spray with an approved fungicide.*

Shell Photo Library

▲ *Fruits infected with brown rot quickly turn soft and brown and become inedible.*

Royal Horticultural Society

▲ *Peach mildew: proper ventilation and a steady water supply are the best precautions.*

a constant steady water supply while the fruit are swelling. Hand-pollinating the flowers, with a camelhair brush, will lessen the possibility of split stone, as will liming the soil if it is too acid.

Peach tree borers: probably the worst pest of peaches in the United States. Since these work within the trunk, the first evidence is a mass of gum on the outside and possibly some brown grass at its base. For years the traditional control was a ring of moth crystals placed in the soil one inch away and surrounding the trunk, applied in early fall. However, since there have been so many changes in allowed pesticides in recent years, it is best to check with your state university for the current approved control.

Curculio: The adult pierces and lays its eggs within the fruits causing them to become wormy, the only external evidence being a tiny crescent-shaped scar. The simplest method of control is to apply the same combination spray recommended by your local authorities for apples when the petals fall. Repeat 10 days later and again 14 days after that.

Japanese beetles: fat, iridescent bronzy beetles that attack both leaves and fruits. Spray as directed for curculio.

Tent and other caterpillars: these, too, are usually taken care of by the curculio spray above.

Donald Smith

▲ *The fungal disease dieback starts at the shoot tips and spreads down the branch.*

Brown rot: this fungal infection usually enters the fruit through a wound, caused by birds, caterpillars or other insects. Peaches with brown rot turn soft, brown and quickly become inedible. Eventually, the skin becomes covered with round patches of pale gray fungal spores, which rapidly spread the disease to nearby fruit. Infected fruit may fall to the ground or remain, shriveled up, on the tree.

Remove and destroy all infected fruits as soon as you see them; do not leave them lying on the ground or in the com-

post heap. The fungus can travel from the fruit down the stalk to the stem.

Peach mildew: this fungal disease can attack the leaves, fruit and shoots. At budburst in spring, young leaves which are stunted and covered with a white mealy coat are probably infected with peach mildew. On fruit, it appears as white patches which may cover the whole fruit and which turn brownish.

Because mildew is associated with damp stuffy conditions, a precaution is to be sure that there is adequate air circulation and a moderate but steady supply of water. Peaches growing in very dry soils, such as those trained against a wall, need watering and then mulching the soil in early summer.

If a tree is infected, cut off all diseased shoots as soon as seen to a point well below the infection; spray with the fungicide recommended by your state.

Dieback: peaches in some areas suffer from this fungal infection. The tips of the shoots die, and the infection can work backward along the whole branch. If the tree is infected, cut back into sound, healthy, living wood; there should be a green layer immediately below the bark in the remaining wood.

Varieties

Belle of Georgia: white, large, freestone; heavy producer. All-purpose, tasty, late August.

Bonanza: a genetic dwarf; flowers pink, double. Yellow fruit, ripens in June.

Champion: an old reliable white; large, sweet freestone. Mid-August.

Elberta: best-known yellow; hardy, productive. Good canner; early September.

Hale-haven: new, yellow, freestone; hardy, prolific. Firm, sweet, juicy; excellent canner. Early September.

J. H. Hale: large, yellow, freestone; almost fuzzless. Better with pollinator; ripen just before Elberta.

Loring: yellow freestone, also good in South. All-purpose fruit; mid-August.

Madison: yellow, blossom-hardy; good keeper, canner, cooker. Mid-August.

Rio-oso Gem: very large, yellow, freestone. August cropper.

Springtime: semi-freestone, extra-early white. Ripens mid-May in California.

Stark EarliGlo: vigorous, flavorful, yellow; cold-hardy. Mid-July.

GUIDE TO PEACH TROUBLES

Symptoms	*Probable cause*
Leaves become yellow speckled, then turn gray and bronze, wither and die	Red spider mite
Leaves curled, distorted	Aphids
Leaves become sticky, covered with sooty mold or cottony spots	Scale insects
Fruit with holes	Birds
Leaves curled, swollen, with red blisters	Leaf curl
Stalk end of peach cracked, stone split and kernel rotten	Split stone
Fruit brown, rotten, covered with pale fungus	Brown rot
New leaves stunted, covered with white mealy coat, white patches on ripe peaches	Peach mildew
Tips of branches die, wood stained brown	Dieback
Wormy fruits	Curculio
Chewed leaves or fruits	Japanese beetles or caterpillars
Gum on trunk	Peach tree borers

Reliance: yellow, mid-August, good quality. Small pit. Has fruited after −25° F (−31.7 C).

Stark Early White Giant: earliest hardy white, right after cherries. Prolific; early July.

Rochester: old favorite reintroduced. Yellow, good flavor; bears over long season. August.

Ventura: medium-sized, yellow, freestone. For warm winter areas. Early July.

Nectarines

Garden State: large, firm, yellow of high quality. Ripens with late August peaches.

Goldmine: hardy, yellow, freestone; a good sort for freezing and canning. Mid-September.

Mericrest: hardy, medium-sized, golden freestone. Good quality. Mid-August. Ripening, 25 days before Elberta.

Nectacrest: medium-sized, extra-fine flavored; white-fleshed. Hardy, a parent of Mericrest. Early September.

Surecrop: large, white, flavorful, freestone. Eat fresh or preserved. August.

Sunglo: golden, large-fruited, excellent flavor. Freezes, cans well. Early August.

Harry Smith

Champion

Other peach varieties

Duke of York: large, rich crimson fruit with pale, greenish-yellow flesh; good flavor; hardy as a tree as well as against walls; one of earliest peaches to ripen.

Waterloo: small to medium-sized fruit; skin yellow, flushed red; flesh greenish white and excellent flavor; growth generally weak; can be grown in greenhouse or outdoors; crops midsummer but can be forced.

Early Alexander: small to medium-sized fruit; skin pale yellow with red flush and mottling; flesh creamy white, only fair flavor; good for outdoors.

The Iris Hardwick Library

J. H. Hale

Donald Smith

Reliance

Donald Smith

▲ *Rochester*

Donald Smith

▲ *Nectarine Sunglo*

Hale's Early: medium-sized fruit with yellow-orange skin flushed crimson; flesh very pale yellow, good flavor; crops late summer but forces well.

Bellegarde: large blackish-crimson fruit; flesh yellow, red next to the stone; rich and firm; flavor excellent; reliable cropper; rippens early autumn.

Dymond: large, pale greenish-yellow fruit with red flush; flesh pale yellow, red next to stone; first-class flavor; hardy and prolific cropper; ripens early autumn.

Peregrine: brilliant red skin; flesh yellowish-white, firm and juicy; excellent flavor; very fertile and reliable cropper; ripens late summer; best all round outdoor variety; not subject to mildew.

Other nectarine varieties

Early Rivers: earliest of all; fruit bright red; rich flavor; ripens midsummer; one of the best for home growing.

Humboldt: late flowering variety, so less vulnerable to frost; fruit large, orange with red flush; very fertile; ripens late summer.

Lord Napier: large greenish-yellow fruit with crimson skin; thin skin and easily damaged; ripens late summer.

Harry Smith

▲ *Belle of Georgia*

Donald Smith

▲ *Nectarine Mericrest*

Pears

Pyrus communis (fam. *Rosaceae*)
Hardy deciduous tree with a life of 60 years and more
Planting to harvesting time: 3–5 years
Size: varies according to variety, rootstock and training: standard 40–50 ft (12–15 m); on quince rootstock 12 ft (3.6 m) high, 9 ft (2.8 m) wide
Yield: mature tree variable with size; dwarf 15 lb (7 kg); espalier 25 lb (11 kg)

One of the most delectable tree fruits, the best pears are home grown. This is because, like tomatoes, pears grown commercially must be tough-skinned to travel well without bruising, and remain firm fleshed for a relatively long period of time. The popular commercial varieties are most often seen in stores because they meet these requirements, and not because they are particularly tasty. There are numerous varieties which have sweeter, juicier and more succulent flesh; these are rarely seen in the markets because they are more easily bruised and are at their best for a short time only. These varieties, when picked fully ripe and warm from the sun, are a real luxury, and one which is available only to the home grower.

Pears go back to antiquity as a cultivated fruit enjoyed by the human palate. In the first century A.D., the Roman scholar Pliny the Elder discussed 39 pear varieties in his famous work *Natural History*.

Possibly pears were introduced into Britain by the conquering Romans of that same first century. Certainly they were in the gardens of medieval monasteries and by the Tudor period had become very popular. Eager for a taste of the homeland they were leaving, the early settlers from Britain brought along the pear and established it in the New World.

Many people prefer the flavor of dessert pears over that of apples, finding it more distinctive and the pears juicier.

Pear trees used to have the reputation of being slow to crop; the old saying, "Plant pears for your heirs," was often quoted. Although this was true when pears were grown on pear rootstock, it no longer applies. Today pear trees are commonly grafted onto quince rootstock to dwarf them and make them come into crop much earlier. In one sense, however, the old saying still applies: pear trees are very long lived, and a healthy specimen may live for two hundred years

under favorable conditions. You can often see ancient pear trees in country gardens, still producing good-sized crops.

Another drawback which has largely been corrected is the problem of size. Wild pear trees (*Pyrus communis*), a European species, are large trees, growing 50 ft (15 m) or more in height. Cultivated pears are descended from *P. communis* and, like them, make lofty trees, much too large to prune, spray and harvest easily, and much too large for small gardens. Growing pears on quince rootstock has a considerable dwarfing effect, and bush, cordon, pyramid and espalier trained trees can easily be accommodated in a small garden.

Dwarf pears grown as open centered bushes is probably the best method for the amateur and gives the highest yield in suitable conditions. However, most pears can be trained very easily and there are many other forms possible. The dwarf pyramid, or central leader tree, follows the natural shape of the pear, which is upright; it is space-saving and convenient for picking. For landscape effect, it is worthwhile training an espalier against a wall.

Besides producing delicious crops, pear trees make very attractive features in the garden. In early to midspring they are covered with masses of white blossoms, followed by leaves with a silver sheen. The foliage of many varieties gives a rich display of autumn color.

Pears can be divided into two groups according to use. Cooking and preserving pears are hard textured, and less juicy and flavorful than dessert varieties; slow cooking with plenty of sugar improves them. They are prolific croppers, however, and tend to keep better than dessert varieties. In cool, exposed sites they are more likely to succeed.

The best category for the amateur grower, is the dessert pear. These are softer in texture, and often have a sweet aroma. They appreciate a warmer site. Dessert varieties also cook and bottle well if picked before they are slightly ripe; they are the best choice for the small garden.

Suitable site and soil

Because pears are Mediterranean in origin, they survive in warmer conditions than apples. The pear tree, though, grows best in temperate climates—where winters are cold but not severe and summers are warm and dry. The principal commercial producing regions are along the West Coast and near the Great Lakes. Most pear varieties available for home gardens grow well from coast to coast in all areas, with the exception of the northernmost states and mountain areas where winters are too severe, and the extreme southern areas where summers are too humid.

Pears blossom earlier than apples, so they are more vulnerable to damage from spring frosts. Avoid low-lying ground or frost pockets. Exposure to strong winds at flowering time can cause considerable damage, as well; insects are discouraged from visiting the blossom, and tender young leaves can be torn or even stripped off the tree. Autumnal winds can desiccate older leaves and cause premature fruit fall. Wind-bruised pear leaves always turn black.

Pears will tolerate less well drained soil conditions than apples, but will not survive dry root conditions. The ideal soil for pears is a deep heavy loam which is slightly acid. Alkaline soils may lead to chlorosis (yellowing) of the leaves. Whatever the soil type, there should be at least 2 ft (60 cm) of rooting depth, though much more is preferable.

Buying a tree

There are several factors to consider when selecting a pear tree, or trees, if you have room for more than one. Choose wisely because the chances are you will be living with the tree for a long time. It is a time-consuming and expensive proposition to replace unsatisfactory trees with more suitable varieties two or three years later, and much time will be wasted unnecessarily.

There are many named varieties from which to choose.The main determining factor is the size of your garden; if it is

fairly small select a dwarf form of a self-pollinating variety. Although some pear varieties are self-fertile, most require a second variety to insure fertilization, and even self-fertile varieties bear heavier crops when there is a suitable pear tree nearby. Some have exceptionally poor pollen, and need two different varieties for satisfactory fertilization, but fortunately there are not many of these. For successful pollination, trees must flower at the same time; however, certain varieties will not cross-pollinate each other and some varieties will not pollinate any others, so check at your local nursery.

Pears are grafted onto either quince or pear rootstocks. Quince produces trees of dwarf size, moderate vigor and high fruit production.

Pear rootstocks are used to make large standard trees of vigorous growth. These are not suitable for the small garden because they grow too big to prune and harvest easily; trees on pear rootstock also take much longer to come into crop.

Buy two- or three-year-old trees for general use. They will settle down more quickly than a four- or five-year-old tree and you can train them exactly as you wish from the beginning.

Planting

Prepare the soil well in advance by breaking up the subsoil and incorporating plenty of well-rotted manure. Correct the pH level if it is below 6.0 by liming. About two weeks before planting, work in a complete fertilizer at the rate of 2 oz per sq yd (60 g per sq m).

Autumn-planted trees establish themselves quickest; try to plant them as soon as possible after leaf-fall. If the soil is frozen or very wet, heel the trees in until conditions improve. Plant, stake, and mulch as for apple trees. Spread out the roots so they occupy the maximum amount of soil from which to draw water and nutrients.

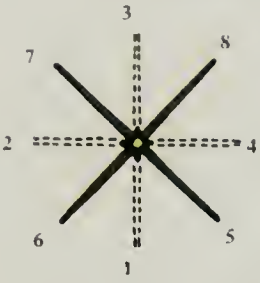
Take care to keep the union of the scion and the rootstock at least 3 in (7.5 cm) above soil level. If the scion roots, the named variety will quickly dominate the rootstock and an overvigorous tree will result.

Bush or dwarf trees should be spaced 10–12 ft (3–3.6 m) apart; pyramids can

Pat Brindley

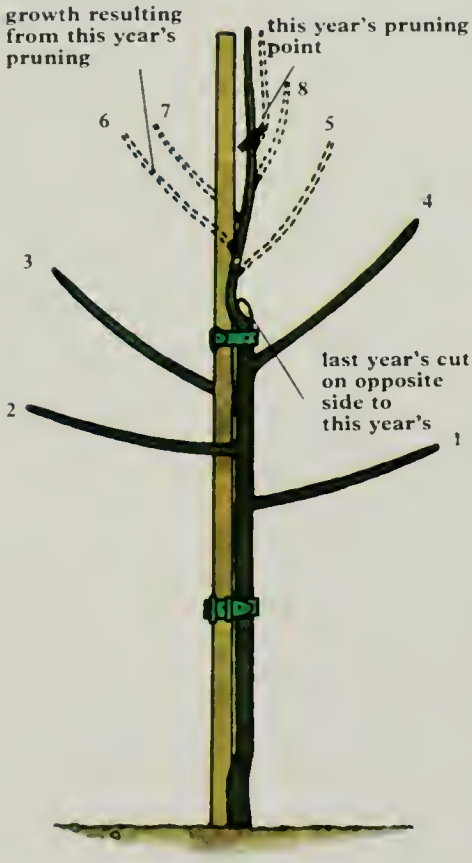
A well-grown pear tree trained as an espalier against a wall. Pears flower earlier than apples, so they are more vulnerable to frost damage. Select a site which has good drainage and is sheltered from winds, so insects can pollinate the flowers successfully.

PYRAMID PRUNING



bird's eye view

bark notch detail above branch 5



Prune central leader each winter to encourage new tier of branches to form. Cut to a bud pointing in the opposite direction of the previous year's bud; leave about 8 in (20 cm) of new growth. Choose four well-placed buds to intersect existing branches. Stimulate lowest bud to grow by notching bark over it.

be as close as 6 ft (1.8 m). Pears growing against a wall should be allowed a minimum of 8 ft (2.4 m) height and a spread of 12 ft (3.6 m). Standard trees should be at least 20 ft (6 m) apart.

Pruning an open-centered dwarf

The initial pruning to shape an open centered dwarf is the same as that for apples with two important differences. Most varieties of pear, if correctly pruned, carry their fruit on spurs close to the main branches and therefore more main branches can be allowed for each tree, say twelve, where eight would be more suitable for apples. Secondly, pear branches in the young tree are naturally slender and have a tendency to droop. To counteract this, continue to prune the leading shoots on the main branches by one third to one half of the new growth, according to vigor, until the trees approach their allotted height and spread. This will be when they are about eight years old, when leader pruning should cease.

Leaders are pruned back for four reasons: to strengthen the branch, to encourage more side growth, to remove deformed or diseased wood and to remove a branch growing in an undesirable direction. If none of these apply, then leader pruning should cease.

Some pears are tip-bearers, which means that instead of producing fruit on short spurs, these are formed on the end of branches. They should be pruned very lightly, and for this reason are not really good for restricted training. They are also better with a longer trunk than is usual in dwarf forms.

Training and pruning a pyramid

Because most pear trees are upright in growth, they are very suitable for training as dwarf pyramids. Pyramids grow with a strong central leader, and are similar in form to a Christmas tree. From this central trunk cropping branches grow away at wide angles with about 1 ft (30 cm) of trunk between each tier of branches. The resulting tree is a very compact and efficient fruit bearer. Formative pruning is done in late winter;

Donald Smith

➤*In small gardens, pears grown as dwarfs, cordons, or pyramids make the most economical use of space. Besides luscious fruit, the flowers are most attractive, and some varieties have leaves which turn reddish in the autumn.*

pruning to encourage fruiting and restrictive growth is sometimes done in summer.

To train a pyramid pear tree, buy a two-year-old. Cut the tree back to about 20 in (50 cm) the first winter it is in your garden, making the cut immediately above a conveniently placed bud. Rub out the first bud below the leader bud. Make sure there are three or four buds left, spaced evenly around and down the stem. These will grow out to form the first tier of framework branches. The lowest bud should be high enough to leave a leg of about 9–12 in (23–30 cm). Any "feathers" should be cut off flush with the main stem. The following winter, and each subsequent winter until the desired height is reached, prune the leader, leaving 8 in (20 cm) of new growth; cut to a bud pointing in the opposite direction to the previous year's bud. This keeps the leader growing straight. Make sure there are three well-placed buds on the remaining part of the leader to make additional whorls of branches. These buds should be as evenly spaced around and down the stem as possible; ideally they should point toward the gaps between branches on the tier below.

Do not retain a bud immediately above an existing branch, but aim for even spacing both up and around. Rub out all unwanted buds; this can be done by pushing them off with your thumb.

The branches and sideshoots may be pruned in summer. Start when the new growth has begun to mature and the shoots are becoming stiff and woody, and brown at the base. Disregarding the cluster of leaves at the base of the new growth, count five or six leaves along the branches and cut beyond a downward pointing one. While the tree is still young flowers may form on the central leader; these should be removed to encourage the production of more side branches.

From late midsummer, when the sideshoots along the branches begin to mature and are about 1 ft (30 cm) long and woody at the base, cut to the second or

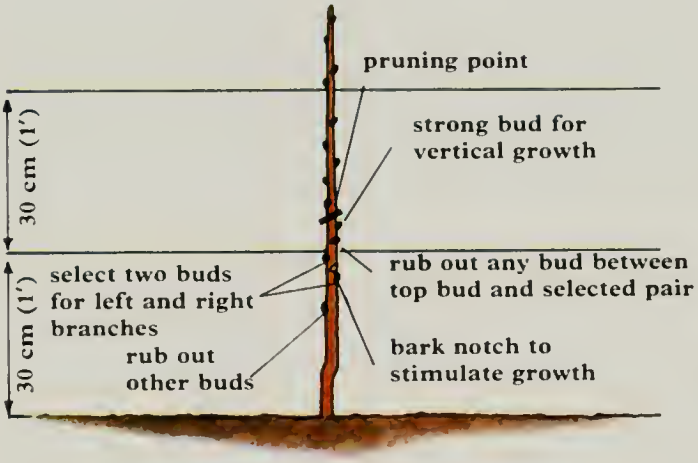
third leaf beyond the basal cluster. This helps to build up strong spurs, close to the main branches. Where there has been growth from a sideshoot pruned in previous years, prune back to the first leaf beyond the basal cluster. If in winter you find there has been further growth from any of these summer cuts, prune it back to the first bud.

Restrict the final height of the pyramid to about 7 ft (2.2 m) by switching pruning from winter to late spring. Cut the central leader back to within ½ in (1.3 cm) of its new growth. When branch leaders reach the length of those in the tier below, or begin to grow close to branches of adjacent trees, deal with them in the same way by cutting them back. Training pyramids requires more work, but they are well suited to small gardens and their compact sizes make them easier to care for and to pick.

Training an espalier

Espaliers can be trained against walls, fences or specially erected posts and wires. An espalier tree has a strong central leader from which branch out horizontal pairs of opposite laterals, each tier parallel to the others. Only a few nur-

TRAINING AN ESPALIER


pruning point
strong bud for vertical growth
30 cm (1')
rub out any bud between top bud and selected pair
select two buds for left and right branches
30 cm (1')
rub out other buds
bark notch to stimulate growth

1. *Espaliers need wire supports, whether in the open or against walls, 1 ft (30 cm) from the ground, and at 1 ft (30 cm) intervals. Immediately after planting, cut the leader back to a strong bud 2 in (5 cm) higher than the lowest wire. Select two opposite buds to form laterals, notch the lower one, and rub out the rest.*

2. *The first summer, tie middle shoot to a cane with soft string; when they grow long enough, tie the lateral shoots to canes as well. The middle cane should be vertical, and the two lateral canes at an angle of 45° from the ground. If the sideshoots grow unequally, lower the cane of the stronger shoot to slow it down; raise the cane of the other slightly.*

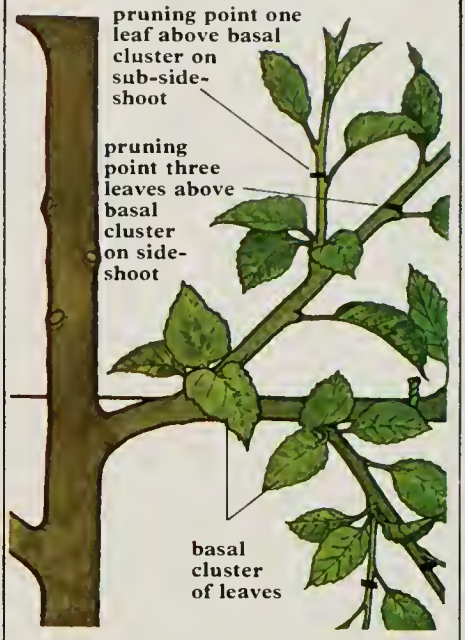
series sell espaliers, and these are expensive. If you train your own, you can make it fit exactly into the available space.

Espaliers need wires, whether against walls or in the open, 1 ft (30 cm) from the ground, and additional wires for each tier at intervals of about 1 ft (30 cm). A horizontal space of 14 ft (4.2 m) is best.

To train your own espalier, buy a whip or two-year-old. Immediately after planting, cut the leader back to a strong bud, about 2 in (5 cm) higher than the lowest wire. This bud will produce a vertical shoot. Below this top bud, select two buds, on opposite sides of the stem; these will eventually become the laterals forming the first tier. Notch above the lower bud. Rub out any other buds.

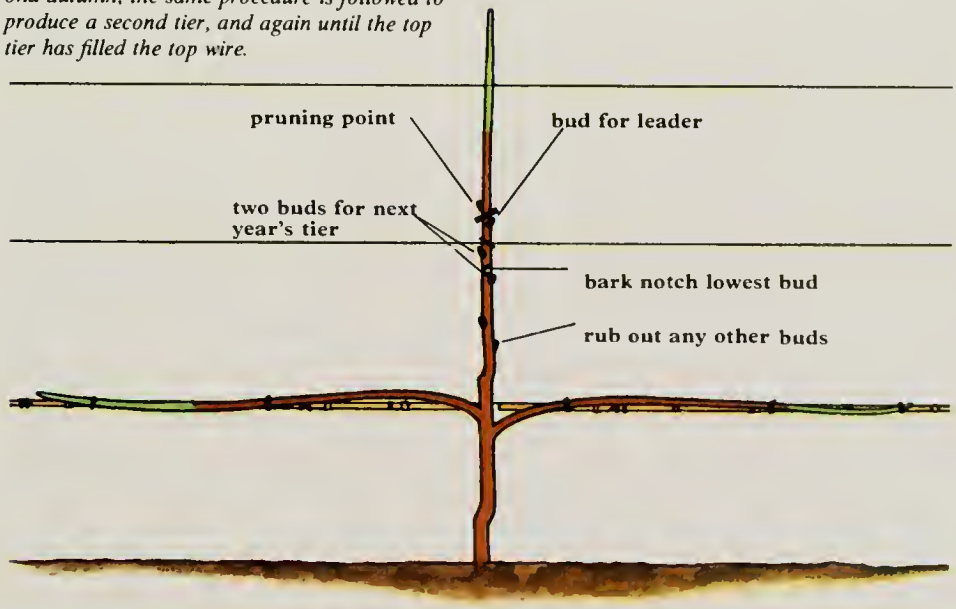
During the first summer, tie the middle shoot to a cane with soft string; attach the cane vertically to the wires. When they become long enough, attach the shoots from the two lower buds to canes as well. Fasten the canes to the wires at an angle of 45°, so that the two

PRUNING ESPALIER LATERALS


pruning point one leaf above basal cluster on sub-side-shoot
pruning point three leaves above basal cluster on side-shoot
basal cluster of leaves

Prune espaliers in midsummer. Cut mature laterals growing from horizontal branches to three leaves above basal cluster; cut side-shoots back to one leaf above.

3. *In autumn, undo the two side canes and bring the branches down to the horizontal wires; secure the branches to the bottom wire. In the second autumn, the same procedure is followed to produce a second tier, and again until the top tier has filled the top wire.*



SPUR PRUNING ON OLD TREES

Pear fruiting spurs will become overcrowded in time, and fruit production may diminish. When this happens, cut out the oldest and least fruitful spurs back to their base with shears or a sharp pruning knife in winter.

lower shoots will be at a 90° angle from each other. Try to keep the two growing equally so they are the same length. If they are growing unequally, lower the cane of the stronger shoot to impede the flow of sap and thus slow it down; raise the cane of the other slightly to encourage growth.

In late autumn or winter, unfasten the two side canes and bring the branches down to the horizontal wires; secure the branches to the bottom wire. However, if they have to be forced down to the horizontal, it is better to leave them and continue to lower them the following summer, finally tying them in when they are two years old, in their second winter. In winter, prune the vertical leader to a strong bud about 2 in (5 cm) above the second wire. Proceed as in the first winter, choosing two more buds to fill the second wire. Continue in this way until the required number of tiers has been formed. When forming the final tier, allow only two shoots to form, one on either side of the central leader, and cut the leading growth back to about 1 in (2.5 cm) above the highest of the two sideshoots. Prune established espalier branches in summer. Prune the side growths as they mature to the third leaf beyond the basal cluster. Cut shoots from laterals that were pruned previously to one leaf beyond the basal cluster at the twig base (see diagram). When the main branches of each tier have filled the space available, cut them back in late spring as required.

Fertilizers and care

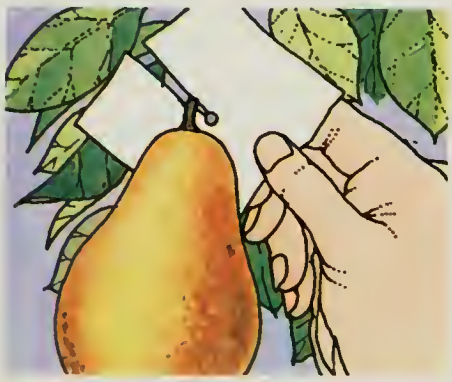
During the first winter, check the trees after hard ground frost and firm any which have lifted. Pears, particularly young trees, are very sensitive to water shortage. In dry weather, water them thoroughly. Watering in late spring or early summer tends to encourage shoot growth, while watering in mid- and late summer aids in fruit swelling. Trees planted against walls are particularly vulnerable to drought, as soil near foundations dries out very quickly.

Pears respond more than any other fruit tree to applications of bulky organic matter. For the first three springs after planting, give an annual mulch of well-rotted manure, 2 in (5 cm) thick in late spring; spread it over an area equivalent to that covered by the tree's branches. Keep the manure at least 6 in (15 cm) away from the trunk. Supplement this with an annual dressing of 1 oz (30 g) sulfate of ammonia and ½ oz (15 g) sulfate of potash per sq yd (sq m) applied in late winter or early spring.

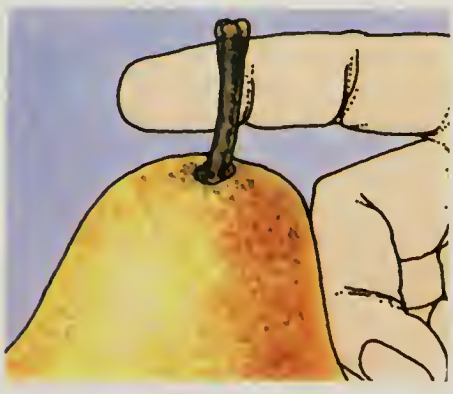
Pears are very nitrogen greedy; for this reason they should not be grassed down. There is one exception, however. If you wish to retard the growth of overvigorous cordons or dwarf pyramids, then grassing down is a good method. Trees competing with grass for moisture and

THINNING AND HARVESTING

1. To get healthy, good sized pears, thin fruit in late spring and midsummer; remove misshapen fruit.



2. Ripening pears are vulnerable to attacks by birds; protect the fruit by fixing cardboard squares onto stalks.



3. If picking pears for storing, pick fruit with the stalk intact, otherwise the pears are liable to rot.

nutrients will be slower than those in cultivated ground.

Spur and fruit thinning

Pears make spurs more readily than apples and as the tree gets older the spurs may become crowded. When this happens, spur pruning is beneficial; prune the oldest and least fruitful ones back to their base. Any spurs which are too long can be shortened by about half. All spur pruning is best done in winter.

Pears tend to produce a great many blossoms; if all were allowed to produce fruit it would exhaust the tree. Judicious fruit thinning is usually necessary although pears need less thinning than apples. Thin first in late spring, when the young fruitlets are about 1 in (2.5 cm) long. Remove and burn all misshapen ones first, as they probably contain pear midge larvae. A second thinning, after the natural fruit fall in early summer, should be done in midsummer. There should be a final spacing of 5 in (12.5 cm) between fruit. This varies slightly according to the age, health and variety of the tree; vigorous mature trees can carry heavier crops than very young or weak-growing ones.

Harvesting

Pears, more so than apples, need to be picked and eaten at exactly the right moment as most varieties are at their best for a short while only. Very early varieties, which are ready mid- to late summer, can be picked straight off the tree and eaten at once. As soon as the base skin color begins to yellow or pale, is about the right stage. Early varieties should be picked before they are fully ripe.

This will mean picking them when the skin at the stalk end of the fruit starts to change color. If left on the tree for longer, they will become too mature and although the outside may appear just right, the center will have started to rot. Midseason varieties, i.e., early to mid-autumn kinds, are picked and then kept in a cool place for about a week or so before eating. To tell if a pear is ripe, lift

the fruit and twist it slightly; ripe pears should part quite easily from the tree. If pears are picked too soon for storing, they will become "sleepy," when the outer flesh becomes soft but does not develop its flavor, and the inner remains hard. The best criterion for picking for storage is the ground color of the skin; when this begins to change, the fruit can be picked. When harvesting, handle the pears carefully as they bruise easily, particularly at the stalk end. Try to pick the fruit in dry weather, as pears rapidly deteriorate if left wet for any length of time.

Storing

Unfortunately, pears do not keep as well as apples so if you want a steady supply, it is best to plant several varieties of trees with fruit which ripens in succession. Early and midseason varieties do not keep for any length of time; it is not worth arranging long-term storage, as you will more than likely be disappointed. Late varieties need to be picked when slightly unripe and stored until they reach their full flavor. If a sharp tug is needed to get the fruit off, they are not ready for storing. Leave them for a couple of days and try again. Be guided also by the change in the ground color, especially near the stalk end; when this begins to change, the fruit is ready for storing. Pick the fruit when dry, with the stalk intact. Store only sound, unblemished fruit; any damaged pears will quickly rot and the rot may spread.

Do not wrap them, but lay them in a single layer on slatted trays in cool 40–45°F (4–7°C) conditions. An empty room or shed will do, as long as there are no severe fluctuations in temperature. They are better in some humidity, and shrivel quickly in dry storage. Inspect them frequently for approaching maturity, which is indicated by a softening of the flesh close to the stalk. Then bring them into a warm room for a couple of days, to finish off the ripening process. Bear in mind that pears stored for too long, or set to ripen in too hot a place, break down without ripening.

Canning and freezing

To offset the comparatively poor storage life of pears, you can preserve them for year-round enjoyment by canning or freezing. Pears to be canned should be fresh and firm. Wash them thoroughly, but do not soak them as this may cause loss of flavor or food value. Cut each pear in half and scoop out the seeded core. They may be stored raw in glass jars or tin cans, or preheated and packed hot in the same types of containers. Carefully follow canning instructions for hot or cold pack from an authoritative source in your state.

For freezing, select firm, well-ripened pears and wash in cold water. Peel them, cut them in half or quarters and remove the core. Prepare a 40 percent syrup (3 cups sugar to 4 cups water), bring to a boil and heat the pear pieces in it for 1–2 minutes. Drain the pears—pouring off and saving the syrup—and cool pears and syrup (to speed up freezing process). Pack the pears in containers and cover with the cold syrup, leaving head space according to type and size of container, seal and freeze.

Galvanized ware (coated with rust-resistant zinc) should not be used when preparing and freezing fruits or their juices because the natural acid in fruit dissolves the zinc, which is poisonous. It is safe to use equipment of aluminum, stainless steel, glass, nickel or better-quality tin, earthenware or enamelized ware. Chipped enamelware, cheap tinware or iron utensils should be avoided as they may impart a metallic flavor to foods being prepared.

Remember that overloading your home freezer with food to be frozen at any one time slows the rate of freezing. Foods not frozen within 24 hours may lose their quality or even spoil. So prepare only the amount of fruits (or other food) that is sure to freeze within 24 hours at a setting of at least 0°F (−17.77°C). This is usually calculated to be about 2–3 lb of food for each cubic foot of your freezer's total capacity. Leave space between packages for air circulation and quickest freezing. Once

frozen, packages may be stacked close together.

Each package of fruit you freeze should be labeled not only to identify the contents, but also with the date of freezing. The latter is to avoid keeping food frozen beyond the time of its best quality. Most frozen fruits and vegetables maintain high quality for 8–12 months when stored at 0°F (−17.77°C) or below. Fruits packed in syrup or sugar keep their quality longer than unsweetened frozen fruits. If you have a large freezer and store a lot of frozen food, you will find it very helpful to keep a list of the foods and the date of freezing (or purchase) as you place them in the freezer. As you remove packages, check them off the list.

Exhibition tips

Pears for exhibition are divided into two categories: cooking or preserving and dessert. The methods of preparation and presentation are the same for both. In both categories the judges will look for large fruits with eyes and stalks intact. The skins should be clear and unblemished, and the color appropriate to the variety. Six is the usual number shown of the same variety, and they should be as uniform as possible. Do not include one or two enormous pears, which would make the remaining fruit seem small by comparison, and spoil the exhibit. Never display overripe pears, small, misshapen fruits, or fruits with blemishes.

To get the best pears, thin the crop while the fruits are still small. As the selected pears ripen, expose them gradually to more and more sunshine by carefully removing the leaves closest to them and tying back the overhanging foliage. Pick more pears than the actual number needed, so that you have a reserve supply when you are setting up the exhibit.

Pears shaped like apples are usually staged with eyes uppermost, and stalk end downward; place one fruit in the center and the remaining fruit around it. You can raise the central fruit slightly by placing white tissue paper underneath it.

Pests & Diseases

Pears suffer from the same troubles as apples, but generally to a lesser degree. Natural predators and good cultivation, including regular feeding, should reduce the risk of damage considerably. If you have had serious trouble in the past, an annual spraying program should be carried out, to control the damage done by a particular pest or disease; otherwise follow a system of "spot" spraying. A dormant oil wash applied in late winter or early spring will control the eggs of aphids and scales. At the green cluster stage, spray against scab. At the early white bud stage, spray with malathion to control aphids, caterpillars and pear midge and apply a fungicide again for scab. At petal fall when nearly all the blossoms are off, spray against scab. Never spray fully open flowers, because of the danger to bees and other pollinating insects. Not all pesticides and fungicides are compatible, so follow manufacturer's instructions before applying them together. It is also important to comply with the time specified on the label for discontinuance of spraying prior to harvesting. And remember that most of these substances can also be dangerous to pets and children, so be sure they are properly stored. There are several varieties of pear that are resistant to the bacterial infection called fireblight and buying them, when available, will control one serious problem of pear growing.

Pear psylla: often a serious pest in the East and Northwest. Small flat nymphs do most of the damage. They feed on the undersides of the leaves, and the flower trusses, in bud and open. Three generations or more can occur in a season. Leaves have pale green patches on them, flowers do not develop, and sticky "honeydew" with black mold on it covers the leaves and shoots. The winter dormant oil wash will deal with the many adults and their eggs. Sevin or malathion can be used in spring.

Aphids: these sometimes infest young growth, causing the leaves and shoot tips to curl and the new shoots to be stunted, sometimes severely. The leaves may also become sticky. The insects are small, green, gray or dark brown in color, and are usually found on the underside of the leaves. Remove and destroy aphid-infested shoots as soon as they appear and spray the tree with rotenone or Sevin. The winter dormant oil wash will kill most of the hibernating eggs.

Pear leaf blister mite: this microscopic insect spends winters beneath the bud scales and during the summer lives inside the leaves. Infested leaves will have numerous yellowish green or reddish pustules on them from midspring onward. The pustules eventually turn brown to black by midsummer, and the leaves fall early. If the attack is a mild one, pick off and burn all infested leaves. In general, this is usually all that is needed in the private garden. However, if you have had serious trouble in the past, spray with lime sulfur in early spring as the buds start to open. Do not spray Doyenne du Comice with lime sulfur, as it is sulfur shy.

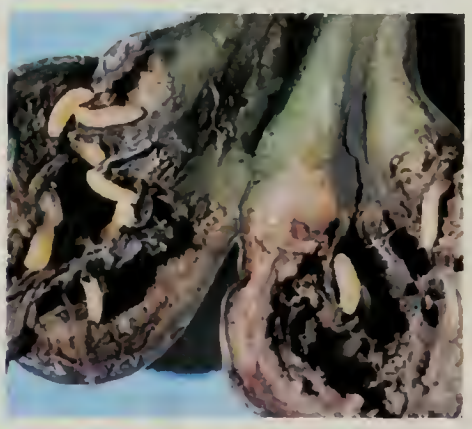
Caterpillars: there are several varieties of caterpillar which may attack pear trees. The treatment is the same for all types of caterpillars: hand-pick the caterpillars in the case of mild infestations, or spray with Sevin or malathion in severe attacks.

Fireblight: this is a very serious bacterial infection which enters the tree through the flowers, and moves from the spurs into the main branches. Dieback occurs and leaves turn brown and black but remain on the tree. It is seen mostly on new shoots which look as though they have been scorched by flame. Cankers develop beneath infected tissues, which ooze a sticky liquid in spring. This liquid contains bacteria, which are then carried by rain or insects to other trees.

If you suspect fireblight, cut out all infected portions, cutting well back into healthy wood. Disinfect hands and all tools after each cut.

Pear stony pit virus: if the pears are misshapen and pitted and have small hard areas in the flesh, then the tree is infected with stony pit virus. In severe cases, the fruit will be completely inedible. At first, fruit on single branches will be affected, but eventually the virus spreads through the whole tree, and the entire harvest from that tree becomes useless. Old trees are most susceptible. There is no cure; dig up and burn any infected tree.

Pear scab: this fungal infection appears as blackish scabs on the fruit, or dark



Murphy Chemical Co.

▲ *This fruit is infested with pear midge larvae, a problem in growing areas abroad.*

Donald Smith

▲ *Pear leaf blister mite infestation: the tiny insects live in the leaves and destroy them.*

brown blotches on the leaves. Occasionally shoots are infected and they will appear blistery and scabby. Remove and destroy all diseased leaves; do not leave them on the ground or the infection will spread rapidly. Spray with an approved fungicide as directed at weekly intervals as long as necessary. In winter, be very careful to prune off all infected shoots as the spores are still on them and can remain viable for at least three years. The scab lesions also provide a means of entry for the fungus disease canker.

Canker: this fungus disease also attacks apple trees, and the symptoms and damage are the same. The bark of branches becomes sunken and cracked; if the canker girdles a stem, it will die above the infection. Cut out all infected parts and paint large wounds with a tree wound-sealing paint.

Pear midge: an infestation of pear trees abroad. When the young fruitlets on a tree do not develop, but become badly misshapen, turn black and fall off the tree, then pear midge is the probable cause. The tiny, white maggots, ⅛ in (3–4 mm) long, live in the young fruit, and later move to the soil where they stay through the winter.

Thorough cultivation under the trees will expose the maggots to insect-eating birds, the weather and physical damage from hoeing. All infested fruitlets must be removed and burned before the larvae have a chance to get to the soil.

Pear scab: a fungal infection which attacks leaves and shoots as well as fruit.

Stony pit virus: pears are misshapen and inedible; old trees are most vulnerable.

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GUIDE TO PEAR TROUBLES

Symptom	*Probable cause*
Leaves sticky and curled, shoots curled	Aphids
Pale green patches and sticky honeydew on leaves, flowers do not develop	Pear psylla
Pale green or red pustules on leaves	Pear leaf blister mite
Leaves eaten	Caterpillars
Leaves turn brown or black and remain on tree, oozing cankers on branches and trunk	Fireblight
Dark brown blotches on leaves, blackish scabs on fruit	Pear scab
Fruit misshapen and pitted, with small hard areas in the flesh	Pear stony pit virus
Misshapen black fruitlets	Pear midge

Varieties

Bartlett: yellow, ripens late August; best known of all pears in United States. Very adaptable.
Beurré Bosc: brown-yellow, ready late September; a slow grower, good for canning, eating fresh.
Beurré d'Anjou: another yellow, ripe in late September; good for eating, canning, preserving. Keeps well.
Clapp's Favorite: yellow for mid-August. Much like Bartlett but still earlier.
Doyenne du Comice: yellow-red, one of best; ripens September. Favored in Northwest.
Fame: green-yellow, for mid-August; a good canner.
Kieffer: yellow, ripe in late September; resistant to blight. Good for canning, eating fresh.
Magness: green, September maturing; keeps well. Also hardy.
Max-Red: red, late August ripening; a red Bartlett type.
Seckel: russet, ripens September; plum-sized. A favorite for pickling; blight resistant. Good quality.
Sheldon: russet, large, round; ready late October. Tree big, sprawling. Good keeper.
Stark Grand Champion: russet. September; prolific, a good keeper.

Other varieties
Beurré Bedford: large, pale yellow fruit, relatively resistant to scab; erect and compact growth.
Doyenne d'Été: small, yellow, conical fruit; one of the first to ripen in mid- to late summer; juicy and pleasant flavor; tree has weak but spreading growth; not very good for restricted training.
Jargonelle: very old variety but still popular; long, greenish-yellow, tapering fruit; relatively scab resistant; heavy cropper.
Gorham: long, pale yellow pear with heavy russeting; good flavor; tree of hardy and upright growth.
Dr Jules Guyot: self-fertile variety; yellow fruit, black dotted skin, often flushed scarlet; tree fertile and hardy, upright growth.
Fertility Improved: sweet, juicy, crisp pear; heavy cropper, often needs thinning; disease resistant; self-fertile; fruit small, yellow, but heavily russeted; tree tall and upright in growth.
Marguerite Marillat: self-fertile pear, although it will not pollinate other varieties; crops well; yellow flesh, skin flushed with bright scarlet; upright, small tree with scarlet autumn leaves.
Merton Pride: green pear of good size; very good flavor; heavy cropper; tree upright in growth.
Beurré Hardy: large, round, conical, coppery russeted fruit with red flush; very good flavor; fertile; tree vigorous, full and spreading; leaves scarlet in autumn.
Beurré Superfin: long, golden yellow fruit patched with russet; less vigorous pear good for small gardens; makes good cordons.
Conference: most reliable of all; long, pale green fruit with silvery russet; prolific cropper; self-fertile but does better if cross-pollinated; moderate flavor.
Louise Bonne of Jersey: greenish-yellow fruit, flushed red; flesh white and delicious; fertile; tree hardy and vigorous; upright in growth; regular cropper; exceptionally beautiful blossom.
Durondeau: fruits long, tapering, red russet; good flavor; stores well; tree small, suitable for small gardens; red autumn foliage.
Packham's Triumph: fruits broad, squat, bright green changing to bright yellow; juicy, very sweet.
Glou Morceau: green pears, turning yellow when ripe; sweet flavor, keeps well.
Joséphine de Malines: small, green fruit, yellow when ripe with a russet patch; flesh pink, with delicious scent and sweet flavor; best of all winter pears.
Winter Nelis: juicy, sweet, smallish pear, best eaten while still yellowish green; tree has slender, arching growth.
Catillac: large, green, cooking pear remaining hard until midspring; scab resistant; tree spreading with broad leaves and large flowers.

Harry Smith

▲ *Clapp's Favorite*

Harry Smith

▲ *Beurré Bosc*

Harry Smith

▲ *Doyenne du Comice*

Harry Smith

▲ *Magness*

A–Z Collection

▲ *Seckel*

Harry Smith

▲ *Grand Champion*

Peas

Pisum sativum (fam. *Leguminosae*)
Hardy annual
Sowing to harvesting time: 7–9 weeks for early varieties; 8½–10 weeks for second early varieties; 9–11 weeks for late varieties
Size: plants vary in height from 1 ft (30 cm) for the smallest dwarf varieties to 6 ft (1.8 m) for the tallest plants. Pods range from 3–6 in (7.5–15 cm)
Yield: to 3 lb (1½ kg) per 10 ft (3 m) row

Tender home-grown peas are one of the finest delights a gardener can enjoy. Once a treat for a few weeks in summer, with careful planning it is now possible to have a variety of fresh peas a good part of the time from late spring through to early autumn.

Peas have a very long history as a garden crop and many varieties have been evolved. There are early, second early and late varieties, peas that climb 6 ft (1.8 m) high and dwarf peas that need little support, the small-seeded and succulent petit pois, mangetout (sugar peas) with edible pods, and purple-podded peas. All of these types can be grown successfully by the home gardener.

The varieties you choose to plant will depend on several factors. Peas need a great deal of space—tall more than dwarf and maincrops more than earlies—so consider how much space you have available. Decide if you like your peas very sweet, if you want to freeze or dry part of your crop, and for how long a period you want to harvest your peas. Also, bear in mind that all peas are a crop for cool-temperate zones. Most varieties will stop producing when the temperature rises above 70°F (21°C).

Two types of seed

There are two types of pea seed, round and wrinkled. In the wrinkled (marrowfat) varieties, some of the starch in the seed has turned to sugar. Although the seeds produce very sweet peas, they hold too much moisture for autumn sowing, and peas sown in autumn must be rough-seeded varieties, several of which are hardy.

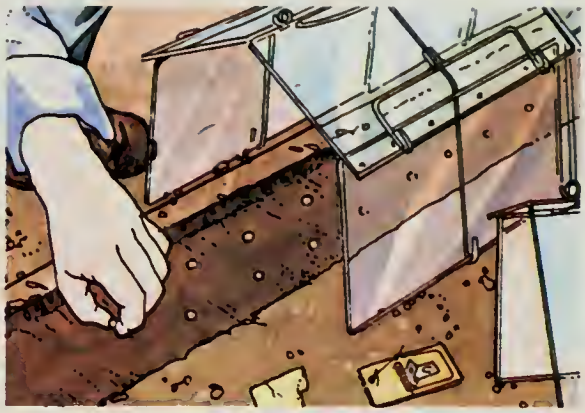
There are dwarf and tall varieties of both round and wrinkled seeds. In general, although there are some exceptions, early varieties of peas tend to be dwarf and the maincrop types taller and bushier.

Choosing a site

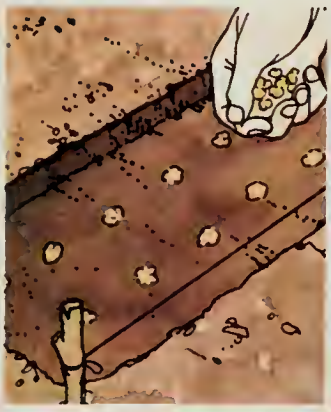
All peas need plenty of space. Choose an open, sunny site, but one sheltered from strong winds. Remember that the taller

SOWING AND CULTIVATION

1. Protect seed from pests with commercial repellent.



2. Sow first early varieties in double rows as soon as the soil can be worked.



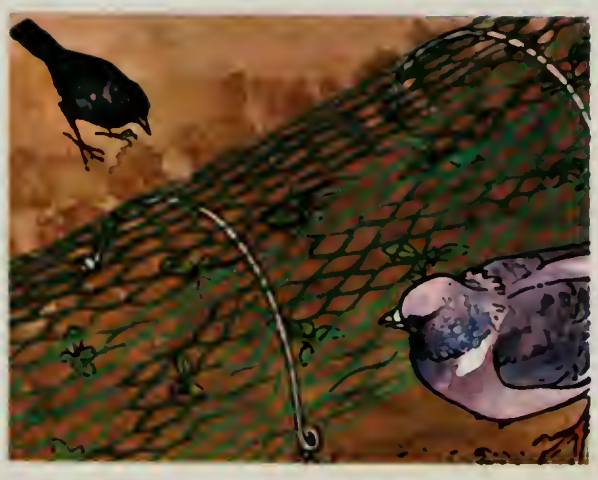
3. Maincrop varieties can be sown slightly later.

4. Hoe around the seedlings to keep down weeds and to prevent pea moths from laying eggs.

5. Remove weeds by hand to avoid damaging the roots.

6. If the soil is very poor, apply a low-nitrogen fertilizer when the plants are young.

7. Water the seedlings often, especially in dry spells.



8. Protect young plants from birds with mesh net pea-guards, 5 in (12.5 cm) high and 8 in (20 cm) wide.

varieties will shade other crops growing alongside them, so plan your rows of crops with this in mind. Also keep in mind that the large spaces between the tall plants can be used for intercropping: quick-growing radishes or shade-loving spinach are both good.

Peas will grow well in a variety of soils, but you should take steps to provide for their special preferences. An acid soil is not very suitable, the ideal being a pH of 7.0. Carry out a soil test and correct any acidity by an application of lime the winter before sowing.

Peas like a rich soil, but not one recently enriched by applications of manure; it is better to sow them in soils which have been well manured the previous fall. Poor soils can benefit from chemical fertilizers containing superphosphate and potash, applied at the rate of 2 oz per sq yd (60 g per sq m) just before sowing. Use nitrogenous fertilizers very cautiously because the pea plant can extract nitrogen from the air for itself, and an excess of nitrogen leads to lush leaf growth at the expense of the pods. Peas need plenty of water and thrive in a reasonably heavy soil which retains moisture, although you must avoid waterlogging. The plants have penetrating roots, so dig the ground deeply and thoroughly.

Sowing the seed

Sow peas where they are to remain for their entire lives because they are deep-rooting and do not usually transplant satisfactorily. The roots must not be disturbed while the plants are growing. Set up supports before planting.

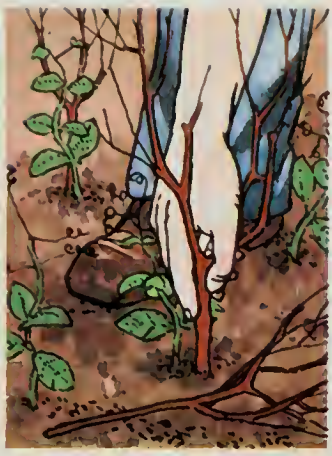
Mice will eat pea seeds as fast as you sow them, so take some precautions. Some seed merchants sell seeds pretreated with a proprietary mouse repellent, and these should be used if mice are a problem. If pretreated seed is unavailable and you have trouble, treat the seed yourself with a rodent repellent.

For all sowings, prepare a shallow drill 6–9 in (15–23 cm) wide, and sow the seed 1 in (2.5 cm) deep in rows 3 in (7.5 cm) apart. Sow 6–10 seeds per 1 ft (30 cm). A good general rule is to allow a space between rows equal to the height of the fully grown plants. The peas take 7–14 days to germinate in the spring.

Spring-sown peas

Spring-sown peas are divided into three main groups: first early varieties, second earlies (also called early maincrop or mid-season varieties) and maincrops. The division is made according to the time that the varieties take to grow. If sown in early spring, first early varieties will produce peas ready to harvest in 7–9

9. Mulch with compost or strawy manure to retain moisture, feed plants and suppress weeds.



10. Use twiggy sticks to support growing dwarf peas.

weeks. Second earlies sown at the same time will need 8½–10 weeks, while maincrop varieties will require 9–11 weeks. It would be possible, therefore, to provide a succession of pickings by sowing varieties of all three groups at the same time. Alternatively, for a longer harvesting season, you can follow the usual practice and make a succession of sowings, starting with the earlies and proceeding to second earlies and then to maincrop. You can also gain time and produce a very early crop by protecting the first sowing of earlies from frost with plastic covers or cold frames.

Autumn-sown peas

Some early varieties of peas can be sown in early autumn to crop in the late fall. For these late crops, choose hardy round-seeded dwarf varieties. In districts where the fall is mild, they can be sown in the open, but elsewhere they should be protected with covers. Sow autumn peas more thickly than spring-sown crops, scattering them along the flat drill rather than planting each seed separately; this allows for some mortality. In the North, late fall sowing often produces a crop the following spring several weeks earlier than those sown in early spring. A severe winter, however, may check them to such an extent that they offer no advantage, producing at the same time as spring-sown peas.

Care and cultivation

Peas are not an easy crop in that they do require frequent attention throughout their growing lives. Hoe regularly to remove weeds, but be careful not to damage the roots when pulling weeds close to the plants.

Peas need ample moisture, so water them frequently, especially during dry periods. Most of the diseases which infect peas are made worse in dry weather, so be on the lookout for any symptoms of trouble during a drought.

If the peas are sown in well-prepared, well-manured soil, then no additional feeding should be necessary during the growth period. In poorer soils the plants will benefit from an application of a compound fertilizer which is low in nitrogen and high in phosphates and potash. Apply this when the plants are young; use 1 oz per yard run (30 g per meter run). A mulch of garden compost, lawn trimmings, peat (unless the soil is acid) or well-rotted strawy manure will help to retain moisture. Apply this as near as possible to the base of the plants, where it will not only supply nutrients and retain moisture, but will also smother some of the weeds.

11. Make a supporting trellis for tall peas with a length of wire stretched between poles 5 ft (1.5 m) high.

12. If birds attack the young pods, drape fine fish netting over the plants and trellis to keep them away.

Staking the plants

Some dwarf and all tall varieties of peas require some staking. The plants grasp the support with their tendrils, so twiggy sticks or wire netting, both of which have plenty of tendril-holds, are the most useful. Unfortunately, traditional pea sticks made from birch wood thinnings are now very difficult to obtain and, therefore, a problem. Use any brush thinnings instead, or, for tall varieties, erect a supporting trellis of wire stretched between poles.

Stake the plants when they reach about 4–6 in (10–15 cm) in height. Dwarf varieties need only small twiggy sticks, one stick to each plant. Push the sticks a few inches into the ground close to the plants, but be careful not to damage the roots in the process.

Taller plants must be supported with stronger sticks, or with posts and netting. If you are lucky enough to get traditional pea sticks or brush thinnings, push these in the ground about 1 ft (30 cm) deep, one next to each plant. The stakes should stand about 5 ft (1.5 m) above ground.

If you decide to build a trellis, place hardwood poles at about 2½ ft (75 cm) intervals along the row. For a 10 ft (3 m) row, you will need five poles. Stretch a length of 5 ft (1.5 m) wide chicken wire or plastic-coated wire mesh along the row, and fasten it to the poles with wire. Make sure your poles are deep enough in the ground and your wire secure enough to withstand the wind.

When the pods begin to form, you can protect your crop from hungry birds by draping fish netting over the trellis.

➤*A well-grown crop of dwarf variety early peas with full green pods ready for cutting.*

Bernard Alfieri

Peas are ready for harvesting when the pods are full. Use scissors to harvest ripe pods as picking by hand can pull the plant out of the ground.

After picking clear the site. Remove any bits of pea stems and save the wire for your next crop.

Harvesting the crop

Garden peas are at their best when fresh, young and green. Never let them become fully ripe and hard, as they will lose much of their flavor.

Peas are usually ready for harvesting about three weeks after flowering. Pick them when the pods have filled out and are firm to the touch. During a very dry summer some pods may not fill out completely, but if some of the peas are large pick them anyway before it is too late. Start picking at the bottom of the plant, and cut rather than pull off the pods. Check your plants frequently and harvest the pods regularly as they become ready. Some varieties may have a second, smaller crop after the main one, although these pods are less sweet and tender than the first.

Storing a crop

Peas should go into the kitchen as soon as possible after harvesting. However, if your crop is large, you may want to dry and store some for winter use. Reserve a few plants for this purpose, and leave the pods to ripen thoroughly before picking. If the weather is damp, cut the plants and hang them upside down in a dry, airy place to finish ripening. Then shell the peas and dry them completely on fine wire or mesh racks before storing them in sacks or jars in a cool, dry place. If you want to freeze some of your crop, pick the peas when they are at their best and prepare them quickly to retain taste and color.

Aftercare

There is no point in trying to retain the plants after the pods have been removed. Clear the site and use it for another crop immediately; brassicas are a good choice. The pea stems should be incorporated in the compost heap, unless there was a bad attack of pea moth. The roots, which are rich in nitrogen, can be left in the ground to benefit the following crop.

There are many different varieties of garden peas, including some very unusual ones. You might want to try one of these less common but delicious types.

Sugar peas (mangetout)

There are a number of varieties of peas in which the pods are eaten whole with the peas still in them; the best known is the sugar pea, or mangetout. These plants vary in height from dwarf to tall, 1–5 ft (30–150 cm), and they are all heavy croppers.

Sow the seed in early spring in a sunny place, and then follow the cultivation instructions given for other varieties. Sugar peas always need staking, and they must always be protected from

DRYING METHOD FOR PEAS

If you want to dry some peas, cut the plants with pods still on and hang them upside down until fully ripened.

birds, which for some reason find them particularly attractive.

Harvest sugar peas when they are young and tender, sometime in the early summer, before the peas have developed in the pods. If you can feel the peas developing, you are too late. Pick and take them straight into the kitchen to enjoy them steamed or stir-fried at their fullest flavor. Older pods make a delicious soup.

Petit pois

Petit pois produce an abundance of small, sweet, delicately flavored peas; for flavor they are one of the finest vegetables. The plants are very hardy and grow to about 3 ft (90 cm) tall, making them suitable for a small garden.

Sow the seeds in midspring, spacing about 6 in (15 cm) apart in rows 3 ft (90 cm) apart. These plants require the same care as other varieties. They also need a great deal of water, so never let them dry out. Harvest the pods as soon as they have filled out in late spring. Cook them whole, as the peas will fall out of the pods, and then they are ready to be served.

Purple-podded peas

Purple-podded peas are attractive plants with purple pods and green foliage. They can reach a height of 6 ft (1.8 m) and they are hearty and vigorous croppers on most soils. Because of their height, they require a lot of space.

Sow in midspring, and follow the cultivation instructions for other varieties. Purple-podded peas crop for an unusually long time, so allow for several pickings into early summer. Harvest when young, and shell and cook the peas (which are green, not purple) as you would for maincrop varieties.

Exhibition tips

Growing the fifty perfectly matched pods required for exhibition demands a great deal of skill. If you want to exhibit your peas, choose a heavy-cropping maincrop variety with large, pointed pods. Sow and cultivate as you would for maincrop peas for the kitchen, and take extra care to keep the crop well-watered and free from pests. When the pods begin to form, remove any that are weak or misshapen to give the exhibition pods more space to grow. In very hot weather, it is a good idea to shade the plants with cloth draped over the supports to prevent the pods from drying in the sun.

On the day of the exhibition, cut the fullest and best-colored pods at the last minute, handling them as little as possible to avoid damaging the bloom. Hold them up to a strong light to make sure that they are well-filled and free of maggots, and then pack them carefully between layers of cotton wool. At the exhibition hall, arrange the pods on a plate in a wheel formation, with the stalks pointing inward. The judges will look for large green well-filled and well-matched pods.

Pests & Diseases

Always take precautions to protect your peas from pests, otherwise you are likely to end up with a disappointing yield. Rotation of crops is an important factor in avoiding pea diseases.

Birds: these are troublesome pests in the early stages, as they attack and devour the pea seedlings. Protect the plants with wire or with pea-guards, half-cylinders of small-mesh wire netting. These can be homemade or bought from garden centers. Any deterrent you find effective will do: try a traditional scarecrow, entanglements of black cotton placed over the plants, polyethylene hung from stakes, or even twiggy sticks placed flat on the ground.

Mice: many inexperienced gardeners sow good seed in well-prepared soil, and still end up with less than half a pea crop. The culprits are mice, who eat the germinating seed and can quickly clear a row. Seed can be purchased already dressed with mouse-repellent from some merchants. If this is unavailable, another precaution is to dress the pea seeds with a repellent or poisonous substance before sowing.

▲ *Maggots from the pea moth can burrow into the pods and ruin the peas.*

▲ *Grayish-brown mold on the leaves is caused by downy mildew.*

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GUIDE TO PEA PROBLEMS

Symptom	*Probable cause*
Maggots in pods or peas	Pea moth
Holes around edges of leaves	Pea weevil
Silvery patches on pods or leaves	Pea thrips
Small holes or maggots in seed	Pea beetle
Powdery white patches on leaves	Powdery mildew
Grayish-brown mold on leaves	Downy mildew
Rotting roots or stems	Foot rot fungus; black rot fungus
Brown patches on leaves or pods	Leaf spot fungus
Pale green or yellow patches on leaves	Mosaic virus disease

Pea moth: particularly troublesome to maincrops; early crops are rarely attacked. The moths are active toward summer, when they lay their eggs on the developing pea pods, or on the stems and leaves. The larvae, which look like maggots with white bodies and black heads, bore through the pods and into the seeds, producing unusable "maggotty" peas. Spray with derris or malathion about 7–10 days before flowering to kill the maggots just after they hatch but before they can burrow into the pods. Spray very thoroughly, as peas will be destroyed if the maggots get into the pods where the insecticide cannot reach them. If pea moth is a serious problem in your area, stop growing maincrops and concentrate on the early varieties, which mature before the moth is ready to lay eggs.

Murphy Chemicals

▲ *Regular holes around the leaf edge are typical pea weevil damage.*

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▲ *Mottled green and yellow foliage is caused by mosaic virus disease.*

Pea weevil: both the adult and the larva of the pea weevil may attack plants. The ¼ in (6 mm) long gray adults feed on the leaves, making regularly notched holes around the edges. The females lay eggs in late spring in the soil around the plants, and the white, grublike larva hatch out and feed on the roots. Hoe around the plants in late spring to stop the adults from laying eggs, and in warm areas control the weevils with a spraying of derris at the same time.

Pea thrips: these can be a serious problem in very dry weather. They feed on the flowers, stems and pods, distorting the pods and reducing the crop. They are most numerous in late spring and early summer, when they lay their eggs on the pods. The orange grubs hatch out and feed first on the flowers and then on the pods and leaves, causing silvery mottled patches which later turn brown. Treat the plants just after the flowers have set with a spraying of derris or malathion. As with pea moth, early varieties are infrequently attacked, so if thrips are a problem in your garden, grow earlies instead of maincrops.

Pea beetle (seed beetle): a large family of insects which feed mainly on the seed of peas and other legumes. The adult beetles lay eggs on the dried seed, and the larva hatch out and burrow into the seed, leaving a small round hole. Infected seed will not germinate or it will germinate poorly. Clean seed purchased from a reputable seed merchant should be fumigated and free of pea beetle grubs. If you discover living grubs, burn the infected seed.

Mildew: powdery mildew appears as white powdery patches on leaves and pods. Maincrop varieties are most often affected, particularly in wet weather. Prevent by spraying the young plants with zineb. Also, clear out any old stems left from early plants, as these can spread the disease.

Downy mildew appears much less frequently, and it is only severe in very wet weather. It looks like grayish-brown mold on the underside of the leaves. Try zineb for bad attacks; otherwise destroy individual affected plants.

Other fungus diseases: peas are subject to occasional attacks but fortunately they are neither very common nor very serious. Foot rot and black rot both cause blackened, rotting patches on the roots and at the base of the stems. Plants grown in good soil as part of a rotation system are rarely affected. Leaf spot fungus disease produces tan-brown patches on the leaves and pods. Dig up and burn any fungus-infected plants.

Mosaic virus disease: pea plants which have mottled pale green or yellow patches on the leaves and pods are probably suffering from a mosaic virus disease. Although not serious, it can cause distorted pods, so pull out and burn any diseased plants you see. Aphids spread the virus; control with an approved spray.

Varieties

There are numerous varieties of peas available to the home gardener, each with different advantages. Many gardeners tend to stick to old and tried favorites, but the seed professionals are constantly working on breeding better strains. Study your seed catalog carefully before deciding what to plant, and give special consideration to those available at your local garden center, as they are probably those most suited to your area. Listed here are some of the most popular and widely available varieties.

Harry Smith

▲ Freezonian

Harry Smith

▲ Green Shaft

Early varieties

Alaska: round-seeded, extra-early with small round plump light-green pods containing 6–8 peas. Hardy, can be planted before others or for fall crop.

Early Frosty: new, wilt-resistant; 2 ft (60 cm). Bears large crop of sweet, tender peas; pods blunt, in pairs, near top of plant for easy picking. Excellent home garden sort; ideal for fresh use or for freezing.

Improved Laxton's Progress: matures three days earlier than original sort, has longer pods holding 7–9 large peas of good quality. Dwarf.

Kelvedon Wonder: one of the earliest of the wrinkle-seeded types; good for successional sowing; heavy cropper of very sweet peas; reaches about 1½ ft (45 cm) in height.

Little Marvel: dwarf variety; sweet; crops well; good in cooler areas.

Second early varieties

Green Shaft: a new variety; heavy cropper; pods borne in pairs at top of plant; resistant to downy mildew.

Lincoln: popular variety for its heavy crops of very sweet peas; produces small dark-green pods; freezes well.

Freezonian: produces well-filled blunt pods containing 7–8 sweet tender peas of excellent quality. Very productive, wilt-resistant and ideal for freezing.

Wando: the most productive, heat- and cold-resistant variety. Pods well-filled with tender medium-sized peas. Excellent either fresh, canned or frozen. Reaches 2½ ft (75 cm) in height.

Purple-podded pea: usually treated as a second early variety; small purple pods have excellently flavored green peas; grows to about 5 ft (1.5 m). Scarce.

Maincrop varieties

Alderman: extensively grown tall variety; long thick pods with large, well-flavored peas; high yield.

Drought-proof: does well under a wide variety of unfavorable conditions; prolific producer of large sweet and tender peas. Of medium height.

Gloriosa: new type which has proved extremely reliable under all conditions; heavy cropper; excellent for drying or freezing.

Pat Brindley

▲ *Little Marvel*

Brian Furner

▲ *Improved Laxton's Progress*

Brian Furner

▲ *Gloriosa*

Brian Furner

▲ *Oregon Sugar Pea*

Trio: new multi-podded variety; good sized peas with an extra high sugar content. Excellent for freezing. The plants grow to about 1 ft (30 cm) high.
Green Arrow: combines high yield with exceptionally sweet tender peas; 9–11 per pod. Good fresh or frozen. Resists downy mildew and fusarium wilt; grows to 24–28 in (60–70 cm) high.

Sugar peas
Giant Melting Sugar: slightly curved pods; tender and delicious when prepared like snap beans. Productive; wilt-resistant.
Sugar Dwarf de Grace: reaches 3–4 ft (90–120 cm) in height; early cropper; produces pods 3 in (7.5 cm) long.
Oregon Sugar Pea: maximum yield; pods of high quality and flavor.

Petit Pois
Gullivert: attractive plants produce a high yield of small pods; delicately flavored peas.
Cameo: a dwarf, smooth, small-seeded Alaska type much used for commercial canning and freezing; 6–8 peas per pod.

Southern table field peas
Black-eyed Peas: the ever-popular small cream-colored peas with dark eyes; dwarf and prolific.
Brown Crowder: long round pods with delicious peas. Good used green or dried for winter; turn brown when cooked.
White Crowder: similar to Brown Crowder, but creamy white.
White Lady: very prolific; round pods with small green peas. Especially suitable for drying.

step-by-step growing guide

Peppers

Capsicum annuum, C. frutescens (fam. *Solanaceae*)
Annual or perennial, but most culinary capsicums are grown as **half-hardy annuals**
Sowing to harvesting time: 16–19 weeks
Size: plants vary in height from 1–3 ft (30–90 cm). Fruit of dwarf varieties about 1 in (2.5 cm) across; large varieties from 3–7 in (7.5–17.5 cm) long
Yield: 1–2 lb (0.45–1 kg) per plant

Originally a native of tropical America, peppers are becoming increasingly popular as a flavorful vegetable cooked in stews and casseroles, stuffed with meat or various mixtures, or served fresh in salads. Originally widely grown only in southern Europe and warmer areas of the United States, development of F_1 hybrid strains has made growing peppers in cooler climates possible. They are now grown in most parts of this country and even southern Canada, and in Europe as far north as England.

Peppers have much to recommend them; their bright red, green or yellow color and flavor add zest to any meal. They are relatively expensive to buy in the stores, but the home grower can produce healthy-sized crops with little initial expense. In good years, when crops are abundant, excess peppers can be frozen or dried and stored like onions. Unlike tomatoes, which are virtually inedible in their unripe state, unripe peppers are very tasty, and indeed preferred by some people to the milder, sweeter ripe pepper. Unripe peppers are dark green, and brilliant red or yellow when ripe.

Peppers are relatively disease- and pest-free, and their cultivation requirements are few. Rich growing medium, warmth and a steady water supply are necessary, but they require no training, tying or pinching out of sideshoots.

Peppers, aside from their food value, make very decorative pot plants; they can be grown indoors and stood out on a balcony, windowsill or paved courtyard during the summer months. In a greenhouse, they have much the same growing requirements as tuberous begonias; a mixed display of flowering plants and bushes hung with peppers can be very attractive.

There are many varieties available from seed catalogs, some of which have inedible fruits and are grown solely for

Derek Fell

➤*Chili plants are very decorative as well as useful. The vivid, bright red hanging fruits which adorn the branches are visually attractive; when dried they are often ground into chili powder or cayenne pepper. These spices are used in the making of curry powder, pickles and Tabasco sauce.*

decorative value. The two main categories of edible peppers are sweet peppers (*Capsicum annuum*) and hot peppers (chilies) (*Capsicum frutescens*). Sweet peppers, also called bullnose, bell or pimiento peppers, generally have larger fruit than chilies. The paprika made from these is much used in Hungarian cooking. The taste of peppers in general varies greatly in intensity, depending on ripeness and variety; some are sweet and mild, while others can be incredibly pungent. The peppery flavor is due to the presence of a chemical compound, capsicin, in the fruit; the more capsicin, the hotter the flavor. All peppers have a very high vitamin C content. The shape, size and texture varies; they can be round, oblong or conical in shape, wrinkled or smooth skinned, and from 2–6 in (5–15 cm) long.

The tapering fruits, 1–7 in (2.5–17.5 cm) long, of the *C. frutescens* types are renowned for their strong "hot" flavor. Because of their pungency, these peppers are mostly used for flavoring only, the bright red flesh being dried and ground into chili powder or cayenne pepper, or shredded. When green, chilies are pickled or made into chili vinegar. Because they are so intensely flavored, though, most households need only a few plants to keep well supplied with chilies.

Suitable site and soil

Peppers are tropical in origin, and will be killed by frost. For this reason, they are started under glass and planted out-

GROWING PEPPERS OUTDOORS

In some countries, pepper plants started under glass are transplanted outdoors in early summer into growing bags such as the one depicted here.

In early summer plunge the pots containing the pepper plants up to their rims in a sunny border, or place them on porch or patio. Lift them in autumn, and return the pots to the greenhouse.

side in late spring in the North. New F_1 varieties have been bred for hardiness, and growing peppers out of doors is certainly less risky than it used to be. A late frost, however, can still be disastrous. Plastic tent protection lessens the risk.

You can combine the advantages of greenhouse and outdoor cultivation: start the plants in a greenhouse and in early summer, plunge the pots up to the rims in sunny borders outdoors or place them on your porch or patio. They then have the benefit of the hot summer months. In autumn lift the pots and bring them into the greenhouse.

Outdoors, and in the greenhouse border, peppers thrive in rich, well-worked soil containing plenty of manure. For growing in pots, standard potting mixtures are suitable.

Sowing and planting out

The timing of sowing depends on the climate and length of growing season in your area, but it is usually in late winter or early spring. You can sow peppers out

➤*Peppers are dark green when not yet ripe; fully ripened peppers are brilliant red or yellow, and slightly sweeter in taste.*

Step-by-step Growing Guide for Peppers 579

Grant Heilman

SOWING AND TRANSPLANTING

1. Begin sowing seeds from late winter onward. Space seeds 1 in (2.5 cm) apart in all directions in the flat.

2. At the three-leaf stage, transplant the seedlings into 3 in (7.5 cm) pots and lower the temperature slightly.

3. Do not allow plants to become rootbound; repot them into 5 in (12.5 cm) pots and richer mixture as necessary.

4. Gradually harden plants off in a cold frame prior to moving them outdoors into the open ground.

of doors, either directly in the ground or in peat pots after the last frosts, in mild areas. Peppers need a long growing season, though, so it is really best to start them off in a warm greenhouse or a warm room.

Sow the seeds in pots or flats, spaced 1 in (2.5 cm) apart in all directions, and push them about ½ in (1.3 cm) below the surface of the soil. Peat pots can also be used, sowing two or three seeds in each pot. A soil temperature of 65°F (18°C) is ideal, but seeds will still germinate if it drops a few degrees below this for short periods of time. The first leaves should be showing two to three weeks after sowing, depending on temperature.

When the seedlings reach the three-leaf stage, move them into 3 in (7.5 cm) pots. The temperature can be lowered now to 55°F (13°C) during the day dropping to 50°F (10°C) at night. Do not allow the plants to become rootbound; as they grow repot them into larger pots and richer soil to encourage the development of good growth. If they are to fruit in pots, use 6 or 7 in (15 or 17.5 cm) pots for the final potting. In the

FEEDING PEPPERS

Prepare homemade liquid manure; dilute it to the color of weak tea before feeding the plants.

Alternatively, buy liquid food and dilute according to manufacturer's instructions; feed while fruits form.

early stages they are very slow to grow but, provided they remain a good color, there is no need to worry.

Never move half-hardy pepper plants straight from a warm greenhouse or kitchen windowsill into the open garden. The plants should be hardened off gradually, until they are completely used to the lower outdoor temperature. Do this by putting them in a cold frame for a short period of time, or giving them protection outdoors. After one or two weeks, the pepper plants can be left uncovered permanently.

It is safest to wait until late spring or early summer before planting out permanently; do this about the same time as you plant out tomatoes. If the spring is exceptionally cold, delay planting out until the weather and soil warm up. Do not let the plants starve, though; if they have to remain in their pots longer because of cold weather, top-dress with fertilizer and water in.

Set out the young plants 15–24 in (37.5–60 cm) apart, depending on variety. Always water the soil well before planting unless it is already moist.

Cultivation and care

Peppers need a steady supply of water if their growth is not to be checked. If the soil becomes dry, even for a short period of time, the plants will droop. The leaves, being thin, tend to dry up more quickly than most; syringing them in hot weather helps reduce transpiration, as well as keeping red spider mite away. A position where they are shaded from the late morning and midday sun is ideal especially when the plants are young. Remember, though, to water steadily and moderately, because overenthusiastic watering can lead to botrytis infections, especially in cool weather.

Peppers grown in pots respond especially well to liquid feeding once the fruits have begun to form and this can be done at routine watering times, using a potash-high food, applied according to manufacturer's instructions. Alternatively, you can make liquid manure by steeping a bag of rotted manure in a tub of water; use this after diluting it to the color of weak tea and apply once a week.

If you have been thorough in preparing the soil for outdoor plants, you should have no trouble with perennial weeds. Any annual weeds which appear can be kept down with a hoe, worked between rows. Be careful not to damage the roots of the pepper plants; hand weeding plants is best. A mulch with clean straw, once the plants are established, will keep the weeds down as well as conserving soil moisture.

Artificial pollination is not necessary

SOWING, CULTIVATION AND CARE

1. If using peat pots, sow two or three seeds per pot; remove all but the strongest seedling.

2. If cold weather delays planting out, top-dress the plants with a balanced plant food and water in thoroughly.

3. Plant out when the weather warms up; the plants should not be over 8 in (20 cm) tall at this time.

4. Give plants protective covering at night or if weather turns cold; take covers off during the day.

5. Peppers need plenty of water, particularly at midday in hot weather; their thin leaves dry out quickly.

6. Mulch with clean dry straw once the plants are established, to keep weeds down and conserve moisture.

as the greenish-white flowers set fruit readily, and may indeed need thinning to get the best sized peppers.

You may need to give support in the form of bamboo poles to the taller growing varieties; the dwarf kinds stand up well without support. Some people advise pinching out the growing tips when the plants are 8 in (20 cm) high, but eventually, when the plants are fully grown, there is little difference between plants treated in this way and those allowed to develop naturally.

Harvesting and aftercare

Peppers should be ready for picking in midsummer; if pepper plants in pots are brought indoors and the greenhouse is heated, harvesting should continue until early winter. Harvesting will stop as soon as the weather brings frost. The length of the harvesting season depends to some extent on local climate, and can also vary from summer to summer. The fruits should be picked as soon as they are of sufficient size, and the flesh is firm and well filled out. A good quality pepper has a smooth pleasing shape and an even color. Peppers taste delicious at all stages, and many people prefer them when they are still green and slightly underripe. Peppers left on the plant to ripen fully will turn a rich red or yellow, depending on variety; they are somewhat sweeter than the green ones.

In some varieties, the fruit hangs down from the shoots; in others, the peppers grow erect from the upper sides of the stems. Cut the fruit from the parent plant with a sharp knife or shears, leaving the remaining peppers, which develop at different rates, undisturbed. Handle the peppers carefully, so that they are not bruised. A strong plant should produce at least six to eight peppers. One word of warning, however: the peppers will remain in good condition on the plant for some time after they are ripe, but if you do not pick them the production of additional peppers will cease. It is best to harvest peppers as soon as they are ready, except perhaps toward the end of the season, when the plant has

Harry Smith

▲ *Peppers started under glass will be ready for harvesting in midsummer; the very late ones can be picked from late summer.*

finished forming fruits. Because peppers continue to flower over a long period, you are unlikely to be faced with a sudden glut of them. Any that are picked green in midautumn will ripen slowly until early or even midwinter.

Hot peppers are picked in much the same way as sweet peppers; in their unripe state they are used for pickling, and when ripe, for drying and grinding into chili powder. Fruit can be stored by threading string through the stalks and hanging them to dry in a cool place. If picked when green, for storage, they will gradually change color until they are red or yellow.

Do not leave the plants in the soil after harvesting has been completed; in temperate climates they are treated as annuals and there is no point in keeping them longer. Pull up and burn or compost old plants. Remember never to put on the compost heap any plants showing signs of pests or diseases.

Exhibition tips

Because of their intensely bright color, peppers and chilies will enliven any display, either on their own or as part of a

CARE DURING FLOWERING

1. Pinch out the first few flowers by hand to encourage the formation of larger fruit. Keep well watered.

2. Prevent infestation by the pest red spider mite with a daily spray of water on the undersides of the leaves.

collection. Although botanically fruit, they are classified as vegetables for the purpose of exhibition. Since they are extremely attractive, they are particularly useful for bringing color to somber displays.

Peppers can be displayed while they are still green, or when they have ripened fully and are red or yellow. This means that timing the date of sowing is not as tricky as it is with some other vegetables, which are at their best for only a few days. As general guide, sow under glass in early to midspring for late summer or early autumn shows.

If you particularly want to exhibit fully colored peppers, and due to unforeseen weather changes it is unlikely that they will ripen naturally in time for the show, you can force ripening. A few days before the show, pick the peppers and wrap them individually in tissue paper. Pack them in a single layer in a box so that all light is excluded. Place the box in a warm room or greenhouse, and inspect the peppers daily. Take out any which have ripened and have begun to shrivel, and store them in a cool dark place until the show.

Twelve peppers is a common number shown; because chilies are much smaller, twenty-four is the usual number required. Try to have double this amount ready for showing, so that you can select the best. Because peppers are by their very nature irregular and unsymmetrical in shape, it is unlikely you will find perfectly uniform specimens. Try to select fruits which are about the same size and color, for the best visual effect.

Cut the peppers with shears, leaving a good sized stalk attached to the fruit. This stalk will come in handy if you are wiring the peppers to a display stand. They should not need much preparation; just wash them lightly and dry afterward. If the pepper is left wet for any length of time, rot may set in and ruin your display.

If you are packing them for transport to the show, wrap them individually in tissue paper. Pack them tightly enough so they do not move about in the box and rub each other, or they may be bruised when you take them out.

Peppers can be displayed on plates or in shallow baskets. Make sure you leave plenty of time to set up the exhibit before the show; chilies are somewhat more troublesome and time consuming to prepare because of their small size.

STORING PEPPERS

Sweet red and green peppers can be stored; thread a string through the stalks and hang in a dry place.

Varieties

Anaheim M: slow maturing, long tapering thick-fleshed fruits. Red; good fresh or dried.

Bell (Bullnose): tall plant with large squarish fruits; flesh mild, sweet, thick.

California Wonder: an old standby that is good for stuffing. Fruits good-sized, broad, thick-fleshed but tender.

Canapé: early, prolific, small, broad-shouldered. Dull green, then bright red.

Crimson Hot: deep, waxy, 6 in (15 cm) long. Favored for ketchup, pickling.

Earliest Red Sweet: very early, fiery red; plants small, 5–6 fruits per plant.

Early Pimiento: All-America winner. Heavy-walled, heart-shaped, smooth. Dark green to bright red.

Florida VR-2: prolific, midseason bearer of sweet, medium-sized fruits. Resists tobacco mosaic, etch and potato Y.

Hungarian Wax: canary yellow fruit turning bright red; long, tapering.

Jalapeno: continuous producer of small thick, very fiery peppers. Popular in Southwest.

Lincoln Bell: sets good quality fruits even in cool weather; 3–4 lobed, very dark green.

Long Red Cayenne: fruits ½ × 5 in (1.3 × 12.5 cm); often curled and twisted. Dries easily.

Pepperoncini: fiery red, pencil-thin sweet fruits, 5 in (12.5 cm) long.

Sweet Banana: long, tapered, yellow; very ornamental. Good for salads, frying.

Tabasco: a well-known variety; very hot. Used in hot sauces. Popular with garden growers in the South.

Brian Furner

▲ *Canapé*

Brian Furner

▲ *Florida VR-2*

Other varieties

Canapé (F_1): very early and suitable for outdoor cultivation; fruit sweet flavored and bright red when ripe; heavy cropper.

Ace (F_1): early; heavy and uniform cropper; equally good for forcing or outdoor use.

Worldbeater: heavy cropper; fruits 5 in (12.5 cm) long; skin dark green turning deep red when ripe; best grown under glass.

Emerald Gem: excellent taste; suitable for sheltered border outdoors or cultivation under glass.

Outdoor: blunt-nosed variety; red when fully ripe; half-hardy, needs protection outdoors.

Slim Pim (F_1): small peppers, about 2 in (5 cm) long with mild, sweet flavor; suitable for freezing; heavy cropper; suitable for outdoor growing in mild areas.

Vinedale: very early variety; fruits mild, sweet, thick-fleshed and pointed; does best in warm, sheltered position.

Bell Boy (F_1): heavy cropper; popular for commercial growing; good for home growing. Requires about 70 days to mature after being set out in the garden.

Pat Brindley

◀Sweet peppers (left) are generally larger and milder tasting than chili peppers (right). Both originated in tropical America and the West Indies, and are treated as annuals in the cooler, temperate climates.▶

Brian Furner

▲ *Crimson Hot*

Novelty varieties

Tompa: similar to a tomato in shape and color; juicier and sweeter than other peppers; suitable for greenhouse or warm, south-facing wall.

Gold Topaz: unusual variety; peppers golden yellow when ripe, with mild, spicy flavor; best grown in cold frame or greenhouse.

Mexican Chili: hot, spicy flavored, small peppers; fruits dried and ground into chili powder. Must be grown in greenhouse for flavoring chili con carne, chicken tamale and many other dishes.

Brian Furner

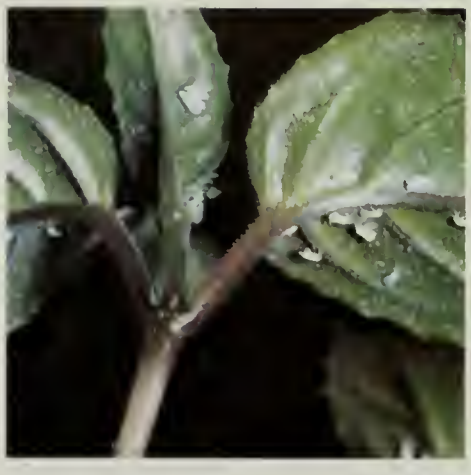
Pests & Diseases

Red spider mite: peppers grown under glass seem particularly vulnerable to attacks by greenhouse red spider mites and can transfer them to the garden. The young and mature mites feed on the undersides of the leaves; the upper surfaces then become pale and speckled. If the attack is very bad, the leaves will turn yellow and fall prematurely. Leaves and stems covered with a fine web is another indication of red spider mite.

Because the insects are most destructive in hot, dry, overcrowded conditions, make sure your plants are properly spaced apart, with plenty of air circulation. Regular syringing in very hot weather is a good precaution. Make sure both sides of the leaves are thoroughly syringed. If you find one or two leaves with a few mites on them, usually close to the main vein, removal of these leaves completely may well be enough to prevent any further outbreak.

If, however, there is a serious infestation, you can use rotenone, Sevin or malathion as a spray. Red spider mites can develop a resistance to a particular chemical if it is used too frequently, so make sure you use insecticides according to manufacturers' instructions, and when there are no longer any positive results, try another control.

Botrytis (gray mold): this fungal infection attacks a wide variety of fruits and vegetables, and is usually associated with cool, damp, overcrowded conditions. Peppers grown under glass are particularly vulnerable. The disease can enter the plant through a wound or through dead or dying tissue. Because botrytis spores are present in the air, poor growing conditions can quickly lead to severe attack. The best precautions are to ensure that seedlings and young plants are not overcrowded, and that air can circulate freely. If there is an outbreak of botrytis, remove and burn all infected leaves and improve the growing conditions; badly infected plants should be removed and destroyed, as it is unlikely they will recover.



G. F. Hyde

▲ *Whiteflies attack a wide range of plants, including tomatoes and peppers.*

Bruce Coleman

▲ *Aphids feed on the sap, resulting in yellow, puckered, curled leaves.*

Whitefly: these insects, which look like small white moths, are more troublesome some years than others. They thrive in hot, dry weather, and whitefly attacks in these conditions can be severe. Like red spider mite, they live and feed on the undersides of leaves, where they suck the sap. They also exude honeydew, which encourages secondary infection from sooty mold. Spray with your state-approved material as soon as they are seen, and again as necessary to destroy any newly hatched insects.

Aphids: these feed on the plant sap, the removal of which results in puckered, distorted and yellowed leaves, especially the young ones. Because aphids breed rapidly, it is vital that you take action as soon as you see them. Spray with rotenone, Sevin or malathion; repeat as necessary. Before harvesting the peppers, remember to allow the recommended time to pass.

Beetles: peppers may also be attacked by a number of beetles, among which are: the Colorado potato beetle with fat striped yellow adults and humpbacked grubs often present at the same time; striped cucumber beetles, also yellow but noticeably longer; and flea beetles which perforate the foliage with shot-holes rather than chew large areas. For all, spray with rotenone, Sevin or malathion.

Tomato hornworm: large fat green, horned caterpillars with voracious appetites; the larvae of large hawk or hummingbird moths. Spray as for beetles, or pick off and destroy.

Pepper maggot: these attack the fruits which also permits decay to set in. At the first sign of the small yellow-striped flies, dust with rotenone or Sevin.

GUIDE TO PEPPER TROUBLES

Symptom	*Probable cause*
Misshapen, puckered, tattered leaves	Aphids, whiteflies
Leaves pale, mottled, turn yellow and fall prematurely	Red spider mites
Leaves, fruits and stems covered in gray mold	Botrytis
Large leaf sections eaten	Potato or cucumber beetles
Small shot-holes in leaves	Flea beetles
Fruits with maggots, decay	Pepper maggot

step-by-step growing guide

Plums

Plum: *Prunus domestica*
(fam. *Rosaceae*)
Damson: *Prunus damascena*
Japanese: *Prunus salicina* and *triflora*
Beach: *Prunus maritima*

Hardy deciduous tree with a useful life of 50 years
Planting to harvesting time: 2–4 years
Size: 20–30 ft (6–9 m) tall; less on trained shapes
Yield: mature standard tree 50–60 lb (22–27 kg) or more

Plums are among the most delicious and succulent tree fruits, and a freshly picked plum is one of summer's finest treats. The trees are hardier than peaches and they will succeed in nearly all types of soil.

Plums are usually divided into cooking and dessert varieties. Cooking (prune) plums are mainly dark colored, with blue-black skins, and have less flesh and a tarter flavor than the dessert varieties. The trees which produce cooking plums are usually larger, hardier and more reliable croppers than the dessert varieties. Dessert plums have a richer flavor and may be yellow, green, red, blue-black, or purple-skinned.

Wherever you live in the United States there are plum trees that will grow especially well in your area. This applies to most of southern Canada as well. Most varieties are good for eating, may be preserved by freezing or canning, and can be made into jams and jellies. Some varieties are also dried as prunes. The warm temperatures and low humidity on the West Coast allow the fruit to dry readily and hence most prunes are produced there.

Damson is a cooking variety not widely grown in the United States. The trees produce oval fruit in early to mid-autumn. The fruits are cooked when ripe and are used for tarts, jam-making and preserving. They are very tough trees, and will crop well even on thin soil. Damsons flower later than other plums, and are less often damaged by frosts and cold winds. They also keep their leaves late into autumn and can be used as windbreaks for less hardy trees.

Gages are usually green-fleshed, with green, occasionally red-flushed, skin. Greengages may also be yellow-skinned and yellow-fleshed. Regardless of the color, they are generally considered to be

TRAINING PLUM TREES

Fan-trained tree
7 ft (2.1 m) high

Although standard plum trees grow too large for all but very big gardens, there are a variety of trained plum trees suitable for the smaller garden, but not all are available locally.

Pyramid tree
8 ft (2.4 m) high

Standard tree
5 ft (1.5 m) clear stem
(mature height to 30 ft)

Half-standard
4 ft (1.2 m) clear stem
(mature height to 20 ft)

Bush
3 ft (90 cm) clear stem
(mature height to 13 ft)

R. J. Corbin

▲ *A fan-trained plum, newly planted against a wall. North-facing sites are not suitable.*

the sweetest and most deliciously scented of the plums. Unfortunately, gages need more favorable growing conditions than other plums.

Suitable site and soil

Because there are no really effective dwarfing rootstocks, plums eventually make moderately large trees. They are unsuitable for very small gardens unless they are fan-trained.

Remembering that you need to plan for the size of a mature tree, you should expect the following heights from the different shapes: fans 7 ft (2.2 m), and standards 20–30 ft (6–9 m).

Plums start to flower earlier than most other fruit trees, in midspring, so if your garden is in a low-lying area or subject to frosts, it is best to choose a late-flowering variety. Although plums do best in full sunshine, they can crop well with less light than pears need. If there is protection from frost, some varieties of plums can be grown against east or west walls.

Because plums need a lot of moisture in the soil, do not plant them next to large trees, particularly those which are surface-rooting, like elms. Although plums need a continual supply of moisture at the roots, the subsoil must never be stagnant or badly drained. A heavy loam or clay soil is preferable, and one that is neither very acid nor very alka-

line. Although the trees crop better when some lime is added to the soil, they do not need an enormous amount, and on limestone soils the trees may show symptoms of iron deficiency.

Buying a tree

Because there are so many varieties available, there are several factors to consider before making your purchase. A major consideration is the ultimate size; this is controlled to a large extent by the rootstock. A few varieties are grown on their own roots, but most plums are budded or grafted onto other rootstocks of known performance. Myrobalan B rootstock will give a fairly large tree. St. Julian A rootstock is semidwarfing and is more suitable for the small garden but is not as widely available.

The grafting of named varieties onto rootstocks is complicated by the fact that not all varieties are compatible with all rootstocks. If an unsuitable combination is made between the scion (shoot of the named variety) and rootstock, the tree may break where the two join together, so buy trees from a reputable source.

Pollination

A second point to consider when buying a tree is pollination. Some plums, such as Stanley, are self-fertile, but many require a compatible pollinator which flowers at the same time, and even the self-fertile varieties will set heavier crops if cross-pollinated. Timing the cross-pollination is less difficult than with apples and pears, because flowering of all plum varieties takes place within the space of 18 or 19 days; from early spring onward. Unless they have been damaged by frost, the trees will remain in flower for exactly 10 days, so the early trees will have just about finished flowering when the late flowering varieties are starting to bloom. Early self-fertile varieties will pollinate early self-sterile varieties, and the same is true for those varieties which bloom later. If you have room in your garden for only one tree, choose a self-fertile one. If you are buying more than one tree, check for suitable pollinators.

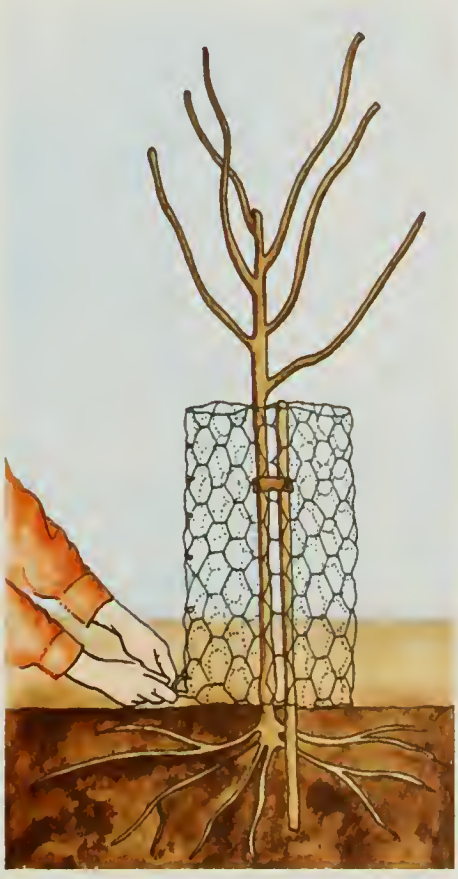
1. Allow plenty of room for the roots. Stake the tree for support. Return soil, making sure it penetrates between roots. Press down very firmly.

If you plan to grow gages, remember that they tend to produce rather small crops. Hence it is a good idea to plant two trees, either two varieties of gages or a gage and another plum tree.

Planting out

This should be done only in early spring in the North. If your soil is heavy, you should work in coarse sand before planting, at the rate of 7 lb per sq yd (3 kg per sq m). Make freely draining soil more water retentive by mixing in peat or rotted organic matter, at the rate of 2½ gal per sq yd (12 L per sq m). This is particu-

PLANTING A PYRAMID, BUSH OR STANDARD TREE



2. If rabbits or other animal pests are likely to be a problem, protect the newly planted tree with wire netting. Leave no gaps at the base.

3. An alternative staking method: make sure the pole is not so long as to interfere with growing branches. Use a soft, strong material to tie.

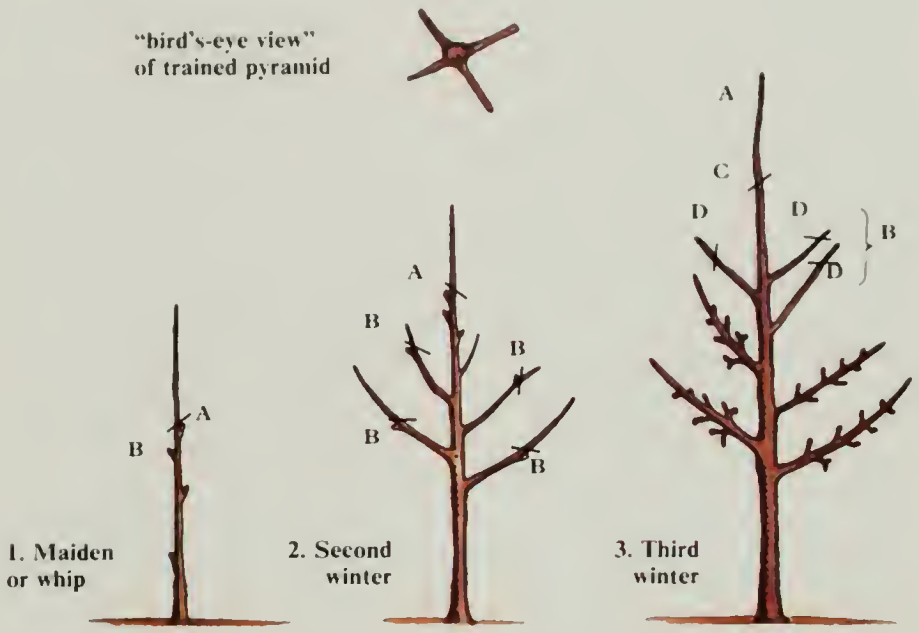
larly important if you are planting the tree against a wall, as the soil near walls tends to be dry. In general, plums will not grow well on light, "hot" soils.

Plant the trees as soon as they are delivered, if possible. If the roots have dried out in transit, soak them in water in a clean can for about an hour. Trim back any damaged roots, making slanting cuts on the underside of thicker roots.

If for any reason planting has to be delayed, heel trees in temporarily in the open. Make a trench, with one side sloping at an angle of about 45°, deep enough to bury the roots up to the soil mark on the stem, which shows the depth to which the tree was growing in the nursery. Lay the tree in this trench and cover the roots with soil just up to the soil mark. Tread in lightly.

Try to get someone to help you when you plant the trees. An extra pair of hands will make it much easier to position a tree straight and upright. Dig each planting hole wide and deep enough for all the roots to be spread out fully in their natural growing position. When you have finished planting and treading down the soil, the tree should be at ex-

FORMATIVE TRAINING OF PYRAMID PLUM TREE

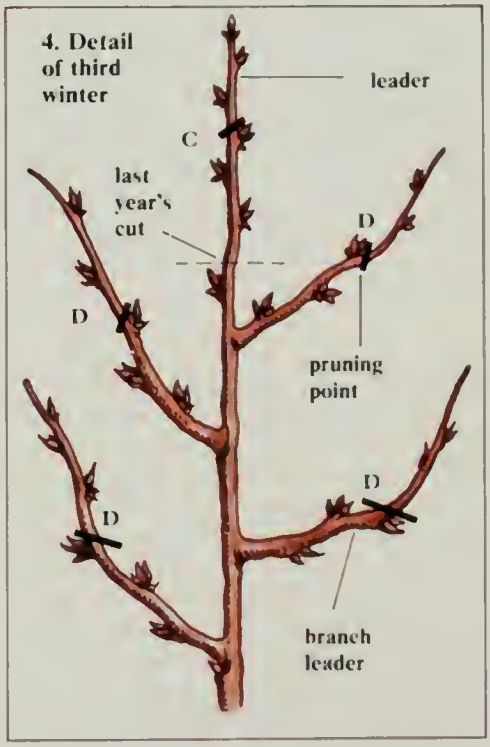


Pruning young pyramid trees should be done in the winter; because the wounds are tiny, the trees are unlikely to become infected.

1. Cut the maiden back to 20 in (50 cm) the first winter the tree is in your garden. Cut back to a suitably placed bud (A). Rub out bud immediately below leader bud (B). Make sure there are 3 or 4 buds left spaced evenly around the stem.

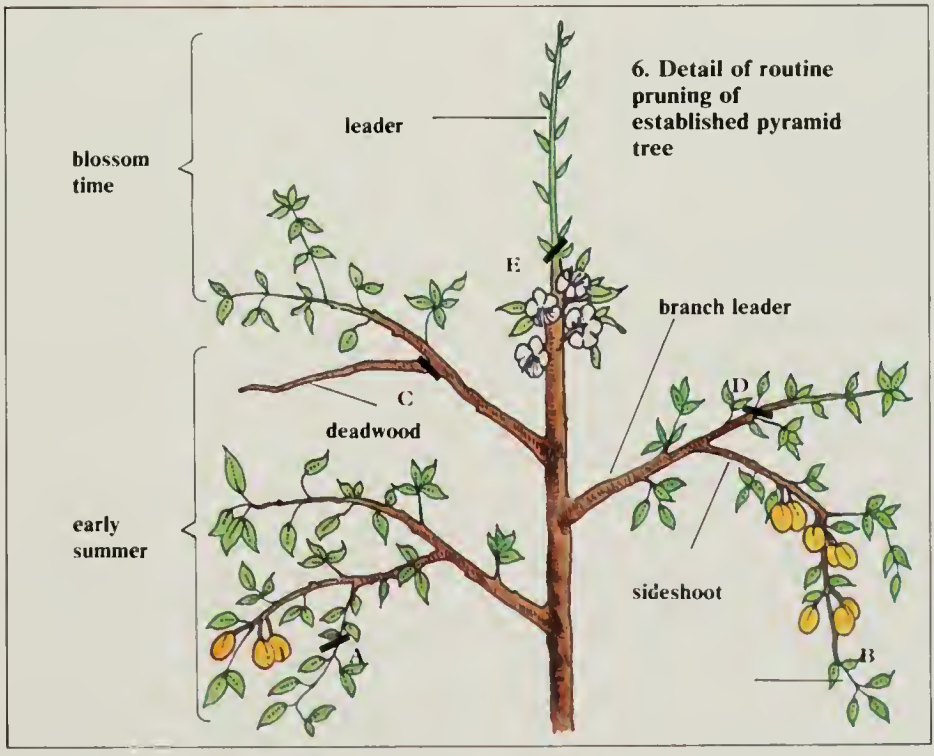
2. The next winter, prune the leader to about 18 in (45 cm) to a bud pointing in the opposite direction from the previous year's pruning; this helps keep the growth straight (A). Make sure there are 3 well-placed buds on the remaining part of the leader to make a second whorl of branches. Prune all branches back to 9 in (23 cm) (B); this encourages the formation of fruit spurs.

3, 4. Train the leader vertically (A); the second whorl of bronches will grow out (B). Cut back the sideshoots formed on the lower set of branches to 4 good leaves during early summer. In the third winter cut back the leader to 18 in (45 cm) (C) and the new whorl of branches back to 9 in (23 cm) (D).



5. Established pyramid tree

5, 6. Plums need much less pruning than older fruit trees because they fruit on old and new wood. Pruning should be done in early spring. Cut out vigorous sideshoots to 4 to 6 leaves from the parent stem (A and B). This encourages fruiting spurs to form. Cut out any deadwood back to living wood (C) and if the wound is larger than 1 in (2.5 cm) treat it with tree paint. When the branch leaders grow longer than 4 ft (1.2 m), cut back by one fourth to one third, depending on the vigor of the tree. Cut back to a suitably spaced spur or sideshoot (D). If the variety has a drooping habit, prune the branch leader back to an upward growing spur or sideshoot. Cutting back the branch leaders encourages the formation of new sideshoots. When the leader grows taller than 8 ft (2.4 m), cut it back into the old wood (E). Do this every three or four years, as necessary.



6. Detail of routine pruning of established pyramid tree

actly the same soil depth as it was when growing in the nursery.

To check that your planting hole is of the right depth, lay a stick across it to show you the ground level and hold the tree in its planting position in the hole. The level of the stick should match the mark on the stem of the soil from its former planting. Make sure the union between the rootstock and scion is at least 3 in (7.5 cm) above ground level, or the scion will form its own roots and the beneficial effect of the rootstock will be lost.

For staking, use 2 in (5 cm) diameter stakes which have been treated with a copper-based preservative. Drive two upright stakes into the planting hole, each about 9 in (23 cm) away from the tree.

Put a spadeful of soil into the bottom of the hole, spread out the roots, sprinkle over a few handfuls of moist peat and start returning the soil. If soil is rather poor, mix a couple of handfuls of sterilized bonemeal with the soil waiting to go back into the planting hole (superphosphate is now considered far superior). Get a helper to wriggle the tree a little so the soil filters well between the roots. Tread the soil down to firm it as you go. Be careful not to injure the bark while planting, or bacterial canker may set in. Keep the soil around the tree free of grass and weeds so the plum does not have to compete with them for moisture during the summer.

If you are planting more than one tree, space them at least 18 ft (5.4 m) apart. Fan-trained trees should be allowed at least 15 ft (4.6 m) wall space.

Water with one 2½ gal (12 L) bucketful and, if there is no rain within a week, give it another bucketful.

Level off the soil and surround the tree as far as the branches extend with a surface mulch of well-rotted compost, manure, leafmold or damp peat, but do not let this touch the tree stem or it may rot the bark.

As soon as the tree is planted, fix a crosspiece to the two stakes, a little below the lowest branch, and fasten the tree to it. Use a ready-made plastic tree tie for this job, or wrap a piece of sacking or cloth around the tree to protect the bark and tie over it with soft string. Finish by twisting the string between the tree and stake to prevent chafing.

Manuring and aftercare

Check frequently to make sure that newly planted trees have not been lifted by frost; firm down any which have been lifted. If the summer is dry, water any newly planted trees and also water established trees which are grown against a wall.

Plums need plenty of nitrogen, and should never run short of lime. A good mulch of rotted manure or compost, rich in nitrogen, is especially helpful to young trees, applied in midspring every year. Mulch an area of soil slightly larger than the area covered by the tree's branches.

In autumn, fork over the soil very lightly. Do not fork too deeply, because plums have very shallow rooting systems, closer to the surface than pears or apples, and overvigorous forking may damage the roots.

The amount of fertilizer given varies according to the type of tree and soil conditions. A good general rule for trees growing normally in moderate to good soil is to apply 1 oz per sq yd (30 g per sq m) of sulfate of ammonia in late winter, and ½ oz per sq yd (15 g per sq m) of sulfate of potash in midautumn. About three years after planting, apply 1 oz per sq yd (30 g per sq m) superphosphate in late winter, and repeat at three-year intervals. Be careful not to overfertilize wall-trained trees, particularly with too much nitrogenous fertilizer, or lush unfruitful growth may result.

If you have no manure or compost available, mulch annually with moist peat to conserve soil moisture, and give twice as much sulfate of ammonia in the fertilizer mixture.

A major problem with plum trees is the continual production of root suckers, which use much of the nourishment needed by the tree. Check for suckers

FRUIT THINNING

If plums are not thinned, small badly flavored and colorless fruit may result. Begin thinning in early summer; thin again when fruits are about half size.

The final distance between fruit should be 2–3 in (5–7.5 cm), or more for larger varieties, so the fully developed plums do not touch.

whenever pruning the tree. Carefully dig away the soil until you can see where the sucker joins the root, then pull the sucker off to remove the adventitious buds around it. Do not cut the sucker, as it is impossible not to leave a bud or two behind. Any injury to the root will heal quickly.

Pruning

One general rule applies to any pruning done to plum trees: all pruning should be carried out in early spring, when the wounds are small and the trees vigorous. Make sure all cuts over 1 in (2.5 cm) in diameter are flush with the bark and covered with a protective sealer. Remove and burn dead or diseased wood, and shorten any unduly long shoots at this time.

Plums form fruit buds along the whole length of younger branches so, aside from cutting out dead wood and thinning overcrowded branches, pruning should be kept to a minimum. In addition, an established plum tree can carry a much larger proportion of wood than other fruit trees, and drastic pruning is never necessary.

Thinning fruit

Plums tend to crop too heavily one year and too lightly the next. An excessively heavy crop usually means small, colorless and tasteless fruit. In varieties with very brittle wood, broken branches can result. To get fruit of the best size and flavor, thin the fruit in two stages. Begin thinning in early summer, then thin again after the tree has shed some of the

fruit naturally at the stone-hardening stage. The fruits at the second thinning should be swelling and about half their final size. When thinning fruits, always remove diseased, injured or badly shaped plums first. Try to aim for 2–3 in (5–7.5 cm) of space between the fruits. Allow 4 in (10 cm) or more for varieties with very large fruit, so that plums can develop fully without touching each other. Do not remove the stalk with the top fruit, as the shoot could be harmed and next year's crop may be damaged.

Supporting branches

Any heavy-bearing branches must be supported because even after thinning the weight of the crop can be considerable. One method of support is to drive in a heavy upright stake next to the trunk, and support the branches by ropes attached to the top of the stake, like a Maypole. You can also support individual branches from below by driving in poles which are forked at the top. Wrap the branch with sacking where it meets the crotch to avoid chafing and subsequent risk of disease.

Growing plums in pots

Plums, particularly the late-fruiting dessert varieties, are suitable for growing in large pots or tubs. Make sure you select a tree with a dwarfing rootstock. Pyramid-trained or bush-trained are the best for pot culture.

Start the trees in pots in early spring, preferably in 14 in (35 cm) pots. Put crocks or broken bricks at the bottom, so the drainage hole is kept open. For the potting mixture, combine (by volume) five parts fibrous loam, one part decayed manure, one part lime or old mortar rubble, and one-half part peat or leafmold. Add ¼ oz (8 g) sulfate of potash for each pot and mix thoroughly into the potting soil. When planting the tree, fill the pot to within 2 in (5 cm) of the rim. Find the sunniest and most sheltered site for the plant.

The cultivation for pot-grown plums is similar to that for open-grown plums, with a few exceptions.

Make sure the soil in the pots never dries out; water daily in summer if necessary. Syringe the foliage with water from early summer onward. Mulching the plants with moist peat will help retain moisture. In early autumn of each year, remove some of the old soil mixture from the top few inches and replace it with fresh soil. In the winter in mild climates, protect the roots from frost by covering the soil in the pots with leaves. Wrap some protective material, such as several sheets of newspaper or fiberglass with polyethylene, around the pots. In cold climates, move the pots into a cellar, cold greenhouse or other frost-free place. From early summer to early autumn, feed weekly with dilute liquid manure. Finally, you will get a heavier crop if you hand pollinate the blossoms with a camel-hair brush several times during the flowering season.

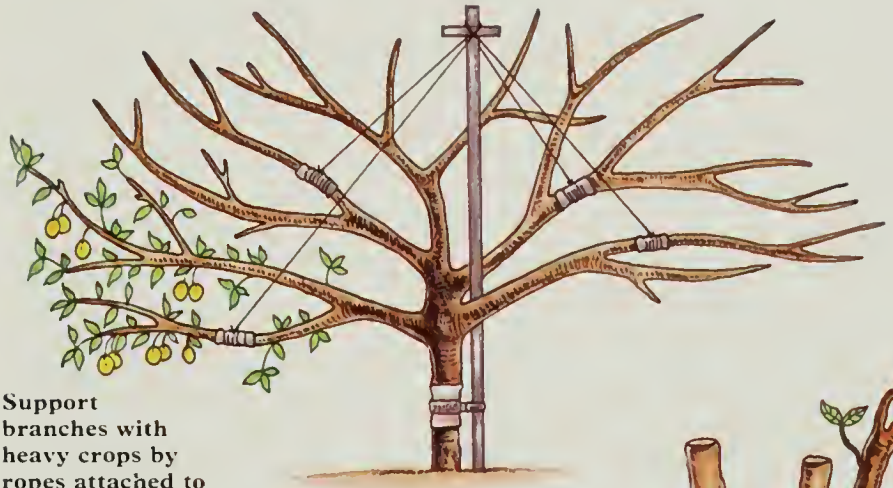
Harvesting

Trees begin bearing fruit when they are about five years old, and cropping is from late midsummer into autumn, depending on the variety. Leave dessert fruit on the tree until it is thoroughly ripe to obtain the best flavor. For jam-making, canning and ordinary cooking, it is best to pick the fruit while it is slightly underripe.

Both dessert and cooking varieties should be picked several times as they ripen; do not clear the tree at one picking. Most varieties can be easily detached from the stalk when ripe, but some types, particularly damsons, are easier to pick with the stalks still attached. Take care not to jerk them off as this can damage the shoots. While harvesting, always remove and destroy any damaged and rotting fruit you come across. Do not allow them to remain on the tree or brown rot may result.

Gages and some other varieties are liable to split in wet weather. If heavy rain threatens and the fruit is nearly ripe, pick the fruit and bring it indoors to ripen. This may impair the flavor a little, but you will avoid cracked fruits, which are often inedible.

METHODS OF SUPPORT



Support branches with heavy crops by ropes attached to a central stake.

An alternative method of support is placing forked stakes underneath the individual branches. Make sure you protect the branch with padding so the bark is not damaged.

Storing

Ripe plums picked in the ordinary way will not keep for more than a few days. If you want to keep plums for a longer period, pick them when they are dry, slightly underripe and with the stalks still attached. Use shears to cut the stalk from the spur, to avoid the risk of tearing the bark. Wrap the fruit carefully, and place it in one layer in a shallow basket or box, making sure that the plums are not touching each other. Put the box or basket in a cool airy place. The fruit should keep for two to three weeks just above freezing in a refrigerator.

For longer storage, plums may be

Pat Brindley

A lovely crop of golden plums. Three-year-old fans start fruiting two years after planting.

preserved in glass jars or tin cans or frozen. For either process they may be left whole or cut in halves or quarters. Freezing requires less time and equipment than the more complex canning procedures. Plums preserved by freezing are very good as a dessert or in salads, and they are also used in the making of jam or as filling for pies. If you plan to use frozen plums later in a jam, it is best to pack them without sweetening. Though the texture of fruit that has been frozen may be slightly softer than that of fresh fruit, the flavor is maintained.

Any plums for freezing should be tree-ripened and deep in color. Wash them carefully but do not let them stand in water. For an unsweetened pack, simply place the washed fruit—whole, halved or quartered—in suitable freezing containers. Leave a space between plums and container lid according to size and type of container; food expands as it freezes. Then seal and freeze at at least 0°F (−17.77°C).

If you wish a syrup pack, cover the plums in their containers with a cold mixture of 3 parts sugar to 4 parts water, or 4¾ parts sugar to 4 parts water if the plums are more tart. Leave head space as discussed above, seal and freeze. A half teaspoon of crystalline ascorbic acid added to a quart of syrup will improve the quality of your syrup pack.

Plums may also be frozen in the form of puree prepared from cold or heated fruit. To prepare puree from unheated fruit, just press the raw fruit through a sieve. Crystalline ascorbic acid or crystalline citric acid may be added to each quart (2 lb) of this puree for better quality. For heated fruit, add 1 cup of water for each 4 qt (4 lb) of fruit, bring to a boil, cook 2 minutes, cool and then pass through a sieve.

Depending on the plums' tartness, mix in ½–1 cup of sugar for each quart (2 lb) of puree, pack into containers—leaving head space—seal and freeze.

Exhibition tips

For both cooking and dessert plums, the judges will look for large, fully ripe fruits with the stalks intact. They should have a good color and undamaged bloom. Small, underripe or overripe fruits or those lacking stalks will be considered defective.

After picking the plums you wish to exhibit, wrap them individually in tissue paper and store them in a cool place until the show. Make sure your presentation of plums is neat and attractive. Do not, however, polish the plums or the bloom will be lost. Lay the plums in lines across the plate, with the stalks pointing away from the front of the table. The number of plums shown is frequently nine. They should all be of the same variety unless otherwise specified.

Pests & Diseases

Plums are susceptible to numerous insects and virus and fungus diseases, and control of them can consume a good part of the cost of successfully producing healthy plums. Most pests and diseases can be effectively controlled with a spraying routine based on the crucial stages of blossom development, while some of the more troublesome pests need an early-spring spraying with a dormant oil to hold them off. For specific details of a spraying schedule based on pests prevalent in your area, plus type of sprays to use, check with your state agricultural agency.

Birds: in many areas, by far the worst damage is done by birds, both when the fruit is on the tree and in the winter when they peck at the young buds. In very bad cases, the entire crop can be destroyed before spring. Smaller trees can be netted. You can place scaring devices in larger trees; these are sometimes effective for short periods of time. Use scaring devices irregularly rather than continuously, or the birds will soon become accustomed to them.

Leaf-curling aphids: these are particularly prolific pests, often producing three generations in one season. In spring the aphids may completely cover the undersides of leaves, which curl and die. The aphids also excrete honeydew, which leads to infection by sooty mold. Control with dormant oil sprays in early spring. In spring, spray the trees with rotenone, pyrethrum, Sevin or malathion before the leaves have curled.

Plum sawfly: caterpillars of the plum sawfly eat their way into the young fruits, and a sticky black substance exudes from the holes they have made. If the infection is severe, cropping will be considerably reduced. Spray as recommended by the various state experiment stations one week after petal-fall.

Royal Horticultural Society, Wisley

▲ *Plum sawfly damage on fruitlets. Spray at petal-fall to prevent an infestation.*

Plum maggots: these relatives of the codling moth eat their way into the fruit. Eggs are laid on or in the fruit and the emerging red caterpillars attack the young fruits. The best way to control plum maggots is by spraying the trees with an oil in late winter. The combination spray mentioned above should eliminate any that might escape.

Japanese beetles: these and other beetles chew the leaves and may or may not attack the fruits. However, they are readily controlled by the regular spray program recommended by the various state experiment stations, using the combination recommended for apples or applied extra as needed.

Curculio: attacks plums as well as many other tree fruits. Eggs are laid in the developing fruits, hatching into worms. Shake out of trees onto sheets beneath and destroy. Spray as for Japanese beetles.

Scales: plums are attacked by the European fruit lecanium, San Jose and others which suck the plants' juices. The dormant oil spray in early spring should take care of them.

Black knot: this is a fungus disease that causes black warty excrescences on twigs and limbs. Remove as soon as discovered, cutting well below the trouble, and burn. Careful attention to the spray program with the combination spray recommended for apples should control it.

Sawflies: these pests occasionally attack plums, feeding on the leaves from early summer to early autumn. The larvae are sluglike, often light and later changing to dark green or black, and they usually attack the upper surfaces of the leaves, which become blotchy and skeletonized. Apply the combination spray as needed.

Red spider mite: these tiny mites, along with others, infest the undersides of the leaves and feed on the sap. Infected leaves will turn brown and fall prematurely. Red spider overwinters on the tree as eggs laid in the crevices of bark; an early spring spray of oil will usually kill the eggs. If red spider mite does appear, from late spring onward, spray with the combination as above.

Silver leaf: a disease afflicting plum trees abroad. It is caused by a fungus and is called "silver leaf" because leaves of infected trees develop a silvery sheen. A second symptom of the disease is a purple-brown stain in the wood when cut across. A final symptom of the disease is the appearance of brown or purple fungal fruiting bodies on the wood.

Bacterial leaf spot: this infection appears first in early summer as brown spots on

Ministry of Agriculture and Fisheries

▲ *A silvery sheen on plum leaves is a symptom of the fungus disease called "silver leaf."*

Ministry of Agriculture and Fisheries

▲ *The effects of honey fungus. The disease attacks the roots, so is difficult to detect.*

GUIDE TO PLUM TROUBLES

Symptoms	*Probable causes*
Tiny sucking insects on buds and new leaves	Leaf-curling aphids
Holes in fruit oozing sticky black substance	Plum sawfly
Holes eaten in fruit in midsummer	Plum maggot
Blotchy, skeletonized leaves	Sawflies
Bronzed leaves, premature leaf-fall	Red spider mite
Leaves yellow prematurely	Iron deficiency
Spots on leaves	Bacterial leaf spot
Brown patches on fruit which shrivels up on tree	Brown rot
Worms in fruits	Curculio
Holes eaten into leaves and fruits	Japanese and other beetles
Scalelike bodies on twigs, buds, etc.	Various scales
Black warty excrescences on twigs and limbs	Black knot

the leaves. These spots develop into holes, and this stage of infection is sometimes called "shothole." The usual combination spray will control it.

Iron deficiency: although plums need only a small amount of iron, if it is lacking the trees cannot manufacture chlorophyll and will suffer from chlorosis. This occurs most frequently on very limy soils. The main symptom is a yellowing of the leaves before autumn. Correct by dressing soil with iron chelates.

Ministry of Agriculture and Fisheries

▲ *Fungus disease causing brown rot of fruit can cause "wither tip" in the shoots.*

Brown rot: this disease attacks peaches and other fruits besides plums. It appears as small brown patches, inside which are circular rings, whitish or yellow in color. These rings contain the spores, which spread the disease to other fruit, particularly if the fruit are damaged by birds or insects. Infected plums may drop off the tree, or else remain on the tree shriveled up. If they remain mummified on the tree all winter, they will reinfect the next season's fruit. Remove and burn any diseased fruit, both on the tree and on the ground. As the infection can spread down the stalk to the fruiting spur, cut off the infected spur when removing mummified fruit. The same combination spray recommended for apples and above will control it.

Honey fungus: a damaging disease which attacks the roots of trees abroad, chiefly those on heavy, poorly drained soils. There are few noticeable signs of this fungus, but premature autumn coloring and leaf-fall may be symptoms.

Donald Smith

Green Gage

Harry Smith

Shiro

Donald Smith

Damson

Varieties

Abundance: a heavy bearer of red-faced yellowish plums. Japanese; early August.
Beach plum: a hardy native of poor sandy soils. Fruits purple, red or yellowish; September; for jams and jellies.
Burbank Elephantheart: dark red, red-fleshed and very juicy. Late August; good for arid areas, too; Japanese.
Damson: a European type used primarily for cooking. Early September; purple.
Fellemberg: one of best purple prunes; ripens September.
Green Gage: a European cooking plum. Greenish; August-September.
Hybrid Sapa: early and heavy bearing; dark purple inside and out. Late July; very hardy.
Kaga: apricot-flavored hybrid. Bears early, prolific; good canner. August; a good pollinator.
Oka: a plum-cherry hybrid; heavy bearer of fruit, purple inside and out. August-September; eating and cooking.
Santa Rosa: Japanese; conical, juicy, flavorful. Red fruits in August; plant with another for pollination.
Shiro: early, golden; Japanese. Low-growing, hardy, prolific; for cooking, canning, eating fresh.
Stanley: an old favorite garden and commercial prune; sweet, rich and deep blue. Hardy and prolific; August.
Superior: a large red Japanese hybrid ripening in August. Good in cold climates.
South Dakota: very hardy hybrid for Northern plains. Reddish yellow; good

Pat Brindley

▲ Stanley

Harry Smith

▲ Yellow Egg

Pat Brindley

▲ Superior

Harry Smith

▲ Kaga

for eating, jams, jellies. September; good pollinator.

Yellow Egg: oval, sweet, juicy, rich-flavored European plum. Ripens September; self-fertile.

Plums grown abroad

Early Laxton: cooking and dessert; very prolific; earliest plum; small, yellowish red fruits, better for cooking than eating.

River's Early Prolific: cooking; small, roundish purple fruit; reliable cropper.

Czar: cooking; reddish purple fruit; hardy, prolific and frost-resistant.

Yellow Pershore: cooking; medium-sized, golden-yellow fruit.

Victoria: cooking and dessert; heavy cropper, excellent flavor.

Warwickshire Drooper: cooking; medium to large yellow egg-shaped fruit.

Gages grown abroad

Early Transparent: dessert; medium round, apricot yellow fruit; excellent flavor.

Denniston's Superb: dessert; pale green with red flush; delicious flavor.

Oullin's Golden Gage: dessert; fruits golden yellow.

Cambridge: dessert; fruits similar to old-fashioned greengage, but better cropper.

Jefferson's Gage: dessert; yellow-green with bronze markings; juicy and delicious fruit.

Damsons grown abroad

Merryweather Damson: cooking; big, well flavored fruit; good for bottling or freezing.

Quetsche: cooking; medium-sized purple fruit.

step-by-step growing guide

Potatoes

Solanum tuberosum (fam. *Solanaceae*)
Half-hardy annual
Sowing to harvesting time: approximately 13 weeks for early varieties; slightly more for midseason; 16–20 weeks for maincrop or late varieties
Size: average tuber diameter 2½–4 in (6.3–10 cm), although this varies greatly depending on the crop and the variety Early potatoes are generally much smaller than maincrop varieties. Plants grow to about 2 ft (60 cm) high
Yield: approximately 15–20 lb (7–9 kg) per 10 ft (3 m) row

Potatoes are one of our staple foods, but in recent years they have become increasingly expensive. For many home growers, this in itself is sufficient reason to try raising their own potatoes, but there are other benefits too. Some of the best quality varieties do not "travel" well so you will find they are never available in shops or supermarkets, and the flavor and texture of early "new" potatoes is undoubtedly at its best straight from the garden.

If you want potatoes all year round, you will need to grow three different groups: early, midseason and maincrop. The earlier the variety, the faster the growth and the lower the yield.

Many people will have space to grow only a limited number of potatoes. In this case, it is best to sacrifice the maincrop and grow the earlies, which are harvested when potatoes are most expensive in the stores. For a 10 ft (3 m) row you will need about 2 lb (1 kg) of seed potatoes.

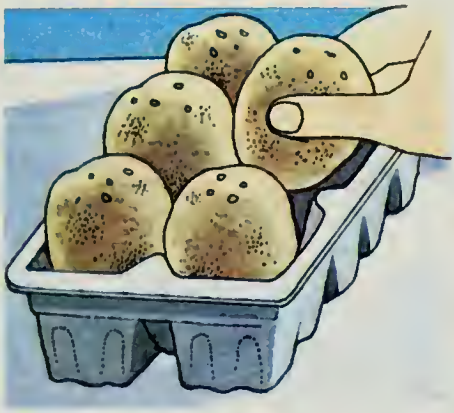
To grow a continuous supply for a family of four throughout the winter and spring you will need quite a large area of land—it will be feasible only if you have a very large garden. The quantities of seed potato to order are 4½ lb (2 kg) of earlies, 11 lb (5 kg) of midseason and 5½ lb (2.5 kg) of maincrop *for each person.* You will need 24 sq yd (20 sq m) of land for this amount; that is 96 sq yd (80 sq m) for a family of four.

Suitable site and soil

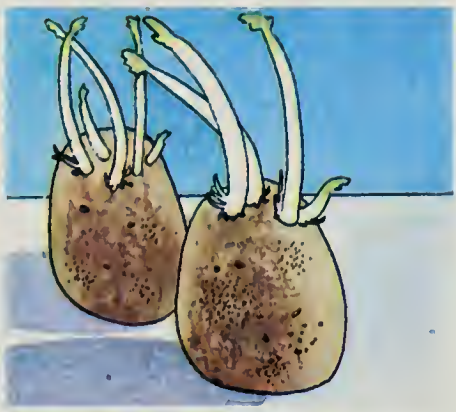
In a simple rotation system, potatoes are generally grown with roots and to precede the cabbage family, which appreciates the clean, well-turned condition in which this crop leaves the soil. Potatoes are a good choice for a first crop on old pasture or grassland that is being taken into cultivation. As a precaution against disease, they must not be grown in the same soil two years in succession. Remember that tomatoes and nightshade weeds are members of the same family as potatoes and can transmit infection; tomatoes should never be included in the same group of vegetables as potatoes in a rotation system.

The site should be open and not overshadowed by trees, walls or buildings.

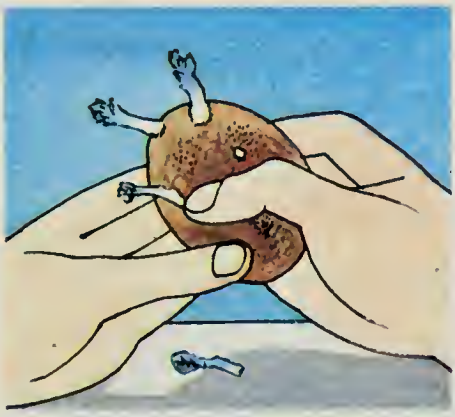
GROWING SEED POTATOES



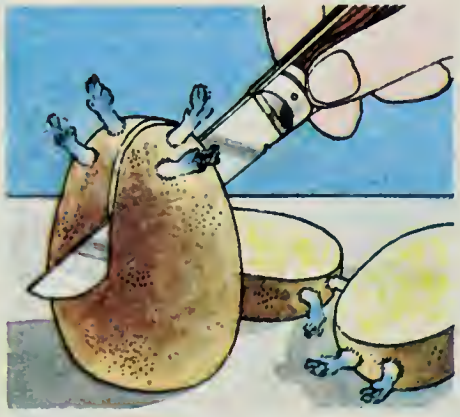
1. Put the tubers in egg boxes, top upward, to encourage sprouting.



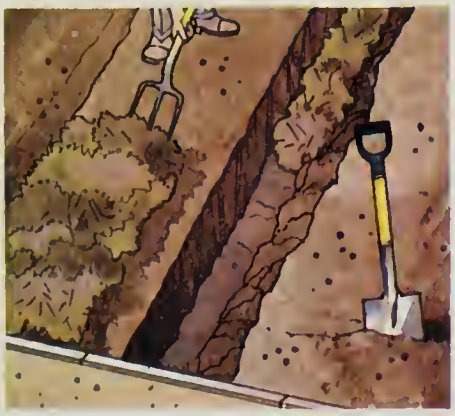
2. Too much warmth or darkness causes shoots unfit for planting.



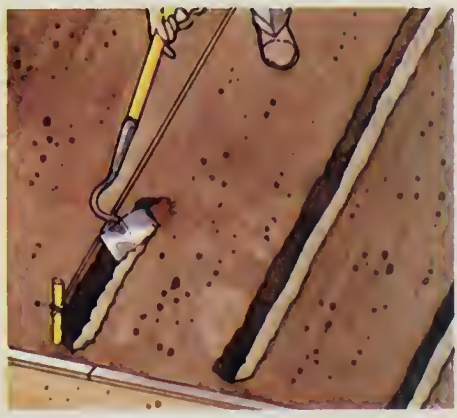
3. Rub off the sprout at the extreme top and all but the two most sturdy.



4. Cut large tubers so that each piece has two shoots. Protect cut surfaces.

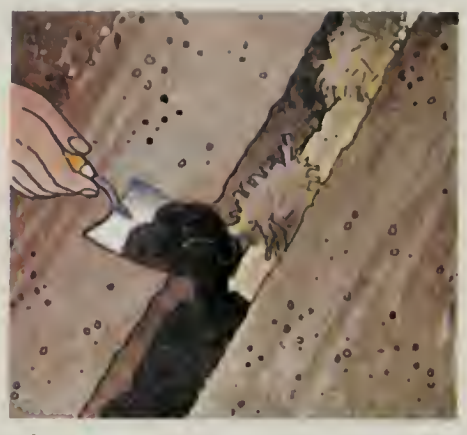


5. Prepare ground by digging over and then manuring before sowing.

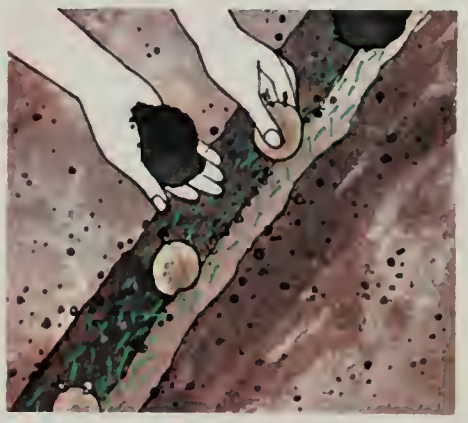


6. Dig V-shaped furrows 3¼–6 in (8–15 cm) deep for planting sets.

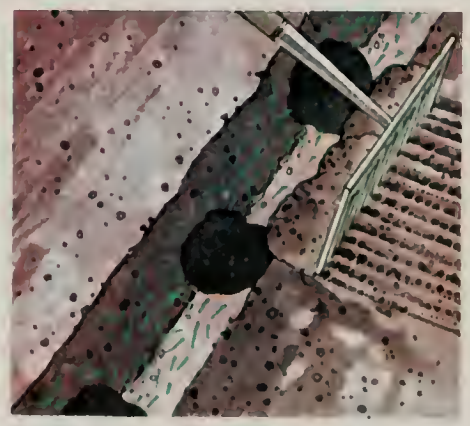
PLANTING THE SETS



7. Put manure where each set is to go, then cover with a thin layer of soil.



8. Scatter lawn mowings in drills and position sets with tops uppermost.



9. Protect sprouts by covering sets with soil by hand, before raking level.

Potatoes are not particular about soil, but on heavy clay soils choose your varieties carefully. Early varieties prefer light land.

In late fall the ground should be well dug and treated with a moderate amount of rotted manure or compost, but not limed. Lime will encourage attacks of scab, and too much nitrogen will produce growth of the stem at the expense of the tubers.

Compost, dug into the soil the previous autumn, is an excellent manure. If organic matter is not available, apply a fertilizer made up of 2 parts each by weight of superphosphate and sulfate of ammonia with 1 part of sulfate of potash at the rate of 1⅓ oz per sq yd (40 g per sq m). Apply this about two weeks before planting.

Preparing the "sets"

The "seed potatoes" from which potatoes are grown are dormant tubers known as "sets." These are obtained from vigorous plants before they are fully mature and then exposed to the air for a few days. Potato sets come from disease-free tubers produced on government-certified farms. Never purchase potatoes that do not have a government certificate. Most people buy every year, but it is also safe to grow from tubers of your own crop every other year. Sets should be about the size of a hen's egg and look plump and healthy, but a delivery usually contains some larger ones. These may be divided as described below. It is impossible to obtain a good crop from poor or diseased sets, so if you are using your own sets be sure they are healthy.

Order seed potatoes in time to begin sprouting toward the end of winter (especially for early varieties).

Put the sets in trays or empty egg boxes in a light, well-ventilated, frostproof place. This enables growth to

➤*Flourishing rows of healthy potatoes: a good example of earthing-up. Sound cultivation will pay off with a heavy crop.*

Step-by-step Growing Guide for Potatoes 609

Brian Furner

10. When plants are 3 in (7.5 cm) high, cover them with straw to give protection against damage by frost.

11. Begin earthing-up when the plants reach 8 in (20 cm) to aid production and protect from light.

begin before it would be wise to plant outside in spring. The stacking wooden fruit trays that have a short leg sticking upward at each corner are also ideal for this. Look for the end of the set where the "eyes" (dormant buds) are crowded together—this is the top. Stand them upward in the trays or egg boxes and, if there is any risk of frost, cover with newspaper. Chitting, as this process is called, takes about six weeks and gives both earlier and heavier crops.

The earlies should go into sheltered ground when you can dig, with midseasons and maincrops following at monthly intervals. You can give some earlies a really good start with covers, but keep the tunnel end closed until all danger of frost is past. Plant when the sprouts on the potato sets you are chitting are 1¼ in (3.1 cm) long. Just before planting, rub off all except two or three sprouts with your thumb. The one to get rid of first is the sprout at the extreme top, then any that are still white (the best ones are purplish) and, last, the least promising of any surplus remaining. Large sets can be cut into pieces, each having at least two strong sprouts. Dust the cut faces with flowers of sulfate or plaster of Paris to check loss of moisture; alternatively, bring the exposed surfaces together and cover with a damp cloth until planting. Take care not to knock off the sprouts.

Planting out

Potato rows should run north to south so that the plants receive the maximum amount of sunshine and do not shade other crops. The rows should be 20 in (50 cm) apart for earlies and 30 in (75 cm) for the bulkier maincrop plants. This allows for earthing-up later on.

Dig V-shaped furrows; the depth will vary depending on your soil type: from

12. Correct (top) and incorrect (bottom) earthing-up. Tubers exposed to light will turn green and poisonous.

13. Spray maincrops against blight in mid-summer and again in late summer with an approved fungicide.

3¼ in (8 cm) deep for a heavy soil to 6 in (15 cm) deep for a light one. Never use a dibber for planting because it is liable to leave an air space underneath the tuber. For improved yield spread a forkful of manure where each set is to go and throw 1½ in (3.8 cm) of soil over it, so that manure and set will not be in direct contact. Scatter lawn mowings thinly in and around the drills before filling them in; this may help prevent attacks of the potato scab fungus.

Place each set in position in the drill, top uppermost, 1 ft (30 cm) apart for earlies and 16 in (40 cm) for maincrops, covering each with soil by hand to protect the sprouts from damage when refilling the furrow. Rake the soil level along each row.

Care and cultivation

Protection is necessary for all potatoes when there is any risk of frost—as there nearly always is with the earlies. Once the shoots are above the surface, ground or wind frost will burn them black, giving a three-week setback. When they are only a few inches (centimeters) high, cover them by drawing up a little soil. When they reach 3–4 in (7.5–10 cm), they may be covered with straw, old hay or leafy branches.

Wait until the shoots can be clearly seen before doing any hoeing, and then do not work the hoe too close to them. Start earthing-up when the shoots are about 8 in (20 cm) high. The stems of potato plants are jointed, and the tubers grow out from underground joints in the stems. Earthing-up creates more joints, which means heavier crops.

Earthing-up also keeps the tubers well buried so that they will not turn green through exposure to light—green tubers contain a poisonous substance and are dangerous to eat. Several times during

14. Yellowish leaves indicate the crop is ready. Lift with a potato fork which has special tines to avoid damage.

15. Dry off the tubers on the ground, briefly. Clean by hand, discard damaged ones and grade by size.

the growing period, loosen up the soil between the rows and push some up with a draw hoe on both sides of the plants, leaving the top 6 in (15 cm) uncovered.

Spray against blight (the fungus disease of maincrops) once in midsummer and again in late summer with an approved fungicide. These sprayings can protect against blight but not cure it. Any flowers that appear during growth should be nipped off.

When growth slows and the plants turn yellow, the tubers begin to mature. This should happen to all the plants at about the same time and if isolated plants show these signs you must suspect disease—cut their tops down and burn them, although the tubers of these plants may be left in the soil until they are of usable size to be harvested.

Harvesting and storing the crop

Early or "new" potatoes are eaten immature in early summer, when they are no larger than a pullet's egg. Carefully lift one or two to see if they are ready for eating; they can be covered up again if they are not. Some people unearth them by hand, pick the tubers they want, and return the soil to let the rest grow on. Dig up the earlies as you need them day by day, because after they are lifted they quickly lose flavor.

A potato fork is a great asset in lifting the crop as its flat, blunt tines greatly cut down the risk of damagaing tubers. Make sure no potatoes or pieces of tuber are left in the ground over winter—they will be a nuisance growing up among the brassicas the next year, and destroy the principle of not growing potatoes in the same soil two years running.

The earlies can go straight into the kitchen as required, but the later crops must be stored. After lifting, let them dry off on the ground for an hour or two, but no longer, before being taken in. Clean off by hand any soil which is sticking to

the tubers, discard any that are diseased or damaged, and take the opportunity to pick out any seed potatoes you may require or to do any other kind of grading. Store them in the dark or under cover from light in a dry, frost- and draft-free storeroom. Bags or boxes will do for storing, but put straw under the bags and take precautions against vermin. The potatoes should be inspected once a month, and any rotten ones should be discarded. Also rub off any sprouts.

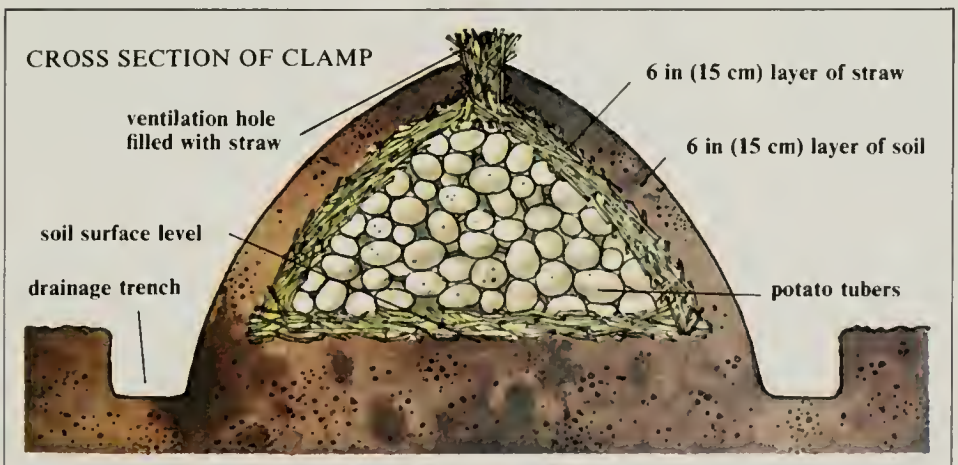
If you have a lot of potatoes and only a small amount of room, one solution is a clamp raised in a dry open situation out of doors on a thick bed of straw. Heap the potatoes into a ridge on the straw and cover them quickly with more straw, then put some soil on top to keep it in place. After 24 hours' drying cover the straw with 6 in (15 cm) of soil, obtained by digging a drainage trench all around the clamp. This is then beaten flat with the spade so it will shed rain. Leave ventilation holes at 1 yd (1 m) intervals along the top, pulling up tufts of straw from below to keep them open. When removing potatoes, inspect those exposed to view before closing the breach. If any are rotten you must remake the clamp. Take the stems away and burn them; do not compost them.

Alternative methods of cultivation

It is not essential to earth-up potatoes but the traditional method described is still widely favored. Cultivation time may be cut by planting the tubers individually along the rows with a trowel (without making a trench) and covering the rows with lengths of black plastic sheeting tucked into slits made in the soil, at both its sides and ends, so as to anchor them. When the shoots start to grow and make bumps in the plastic, make openings with scissors in the form of plus signs ro release them. The opaque sheeting conserves moisture, inhibits weeds, and shields the shallow-grown tubers from light. Harvest the potatoes by cutting or rolling back the plastic and lifting them up with a hand fork or potato fork.

Growing under glass

Spring supplies of new potatoes can be produced by planting them in warm frames in midwinter, either directly in the soil or in pots, but few gardeners have this much frame accommodation. Half bury each upright set in an 8 in (20 cm) pot about a third full, and earth them up as they grow. Potatoes can be successfully grown in pots under glass. Fill 8 in (20 cm) pots with a good quality

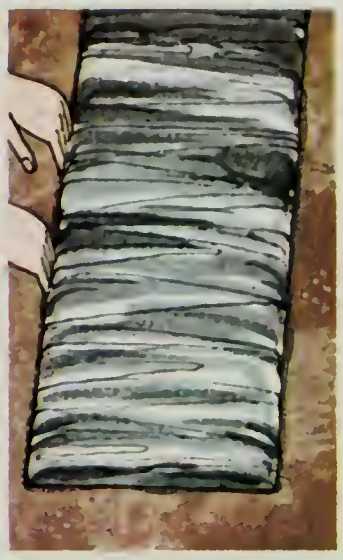

CROSS SECTION OF CLAMP
ventilation hole filled with straw
6 in (15 cm) layer of straw
6 in (15 cm) layer of soil
soil surface level
drainage trench
potato tubers

Storing in an outdoor clamp. Inspect potatoes regularly and, if any are rotten, remake the clamp. Potatoes in a well-made clamp should keep several months.

GROWING UNDER PLASTIC SHEETS

1. There is no need to make a trench. Dig holes along the row with a trowel and plant the tubers individually.

2. Cover the rows with lengths of black plastic sheeting. Tuck sheet in slits dug in the soil, at both sides and ends, to anchor.



3. When the plants start to grow and make bumps in the plastic, cut openings in the sheet in the form of plus signs.

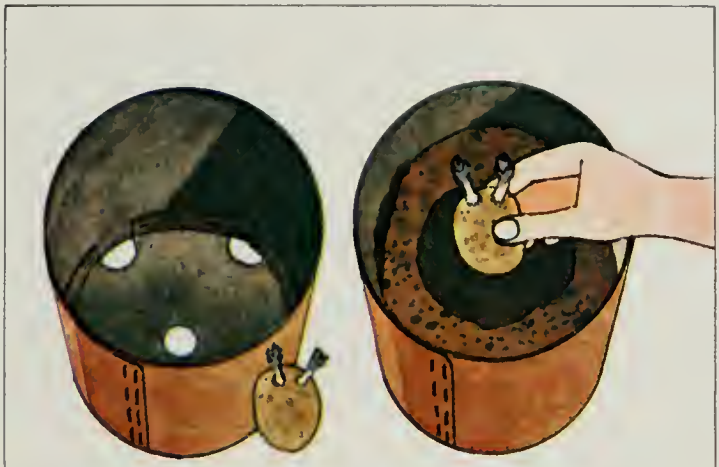
4. The sheeting conserves moisture, inhibits weeds, and shields the shallow-grown tubers from the light. Roll back plastic sheeting to harvest. Lift crop with a hand or potato fork.

soil mix and plant one sprouted tuber in each pot. If you have a heated greenhouse, plant the tubers in late winter and the potatoes will be ready in late spring. If you have an unheated greenhouse or cold frame, expect potatoes in early summer from an early spring planting.

Growing in containers

If your garden is very small, you may want to grow some early potatoes in containers outdoors, or on a patio or balcony. Tubs made from half wine barrels or 1 ft (30 cm) plastic containers are the most suitable. Fill with a good quality soil mix and plant three seed potatoes in each container. If your containers will be indoors, you can plant at any time; if outdoors, late winter or early spring is the best time.

Keep the containers in a warm, sunny place, and bring them indoors if there is a threat of frost. Use a small hoe to earth-up the plants exactly as you would



GROWING POTATOES IN CONTAINERS

Yet another way of growing potatoes outdoors is to plant them in large containers. Use good quality soil mix and plant one seed potato in each 1 ft (30 cm) container. Use a hand fork when harvesting the crop.

if they were planted in the ground. Your small crop should be ready for harvesting in about 12 to 14 weeks. Use a hand fork to harvest the tubers. You can expect a yield of about 6½ lb (3 kg) from a barrel or 2.2 lb (1 kg) from a large tub.

Exhibition tips

You can grow exhibition-quality potatoes in much the same way as you grow tubers for the table, but with special care and with some differences in cultivation details. As with normal cultivation, sets for sprouting should be about the size of a hen's egg, but they should not be cut into pieces for sprouting. Plant them in early spring at intervals of 2 ft (60 cm) in drills 2 ft (60 cm) wide, 6 in (15 cm) deep and 3 ft (90 cm) apart. As well as lining the drills with garden compost or well-rotted manure, place each set on a mixture of old, crumbly manure, sifted peat and leafmold separated from the set by old (but not diseased) potting soil, and cover them with the same mixture. Take care not to let any manure or compost touch the sets.

During cultivation, be extra careful not to tread on the drills when earthing-up; remove any weak, spindly shoots as soon as you notice them; keep the healthy stems upright by tying them carefully to stakes; keep the plants well earthed-up so that the tubers do not turn green; water the plants, using a fine rose on watering can or hose, during dry weather; and be extra vigilant where pests and diseases are concerned.

Growing exhibition potatoes requires a great deal of space, as you will be required to exhibit either six (for a single dish) or twelve (for a collection) regularly shaped, shallow-eyed, matching tubers: you will be lucky if you find six such tubers in a 30 ft (9 m) row.

Do not leave the tubers in the ground so long that they are large, heavy and misshapen by the time that you dig them up. Lift them in late summer, handling the tubers very gently. Put them carefully in a container lined with sacks and cover them with dry vermiculite or soft, dry sand. Keep them in a cool place, which should be as dark as possible to prevent the tubers from greening. Near to the time of the show, wash the tubers very carefully. (the skins are extremely tender) with a sponge soaked in soapy water. Dry very gently with a soft cloth (pat the tubers; do not rub them), wrap in tissue paper and put them back in the dark until the day of the show. The judges will look for uniformity of size and shape and a clear skin with few eyes.

Pests & Diseases

Potatoes can suffer from many pests and diseases, but the ones given here are those most likely to occur in the garden.

Eelworm: potato root eelworm can be a very serious pest. Eelworm cysts (egg sacs) can lie dormant in the soil for several years and, when potatoes are planted on infested ground, the larvae attack the tubers, producing potato sickness. Affected plants are stunted and pale green or yellow, they wilt easily and die when immature. Tuber production will be very small. If eelworms are present, there will be tiny dots on the roots, which later become brown. Infected plants and tubers should be destroyed, and infected soil should be put down to grass for eight years. There is no effective method of destroying the cysts. Crop rotation is important in controlling eelworms; never grow potatoes on the same ground two years in a row since the eelworm population will build up.

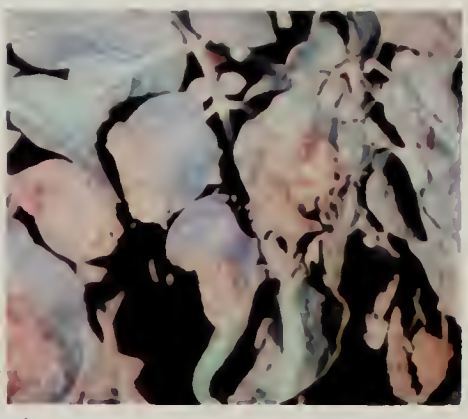
Wireworm: these pests can cause much trouble by boring into the potatoes. They are a particular problem in wet summers, and they often occur in freshly dug pasture or on wasteland. If you think wireworms might be a problem, grow early varieties as these are rarely attacked, and lift maincrop potatoes as soon as the tubers mature.

Slugs: slug damage is most likely in wet summers and in heavy, wet soils. Discourage slugs by keeping the garden clear of hiding places and by limiting the use of manure on heavier soils. Use metaldehyde bait to kill them. Early crops are almost never attacked by slugs; damage is usually to maincrop types, and even some of these varieties seem to be immune.

Colorado beetle: Colorado beetle is a very destructive pest and rather widespread in the United States. The Colorado beetle is a potentially dangerous pest to crops, and its presence must be countered as soon as possible.

Brian Furner

▲ *Leaves attacked by the leaf-roll virus.*



Murphy Chemical Ltd.

▲ *Brown patches are a symptom of blight.*

GUIDE TO POTATO TROUBLES

Symptom	*Probable cause*
Pale green or yellow leaves	Eelworm Aphids Virus diseases
Yellowing leaves on blackened stem	Blackleg
Brown-black patches on leaves and stems	Potato blight
Curling or rolling leaves	Virus diseases
Large holes in leaves	Colorado beetle
Brown or white dots on roots	Eelworm
Small round holes in tubers	Wireworm
Large holes in tubers	Slugs
Tubers with sunken areas or brown flesh	Potato blight
Large irregular growths on tubers	Wart disease
Rough, discolored patches on tubers	Scab diseases

Murphy Chemical Ltd

▲ *Common scab—only the skin is damaged.*

▲ *Slugs produce large interior holes.*

Aphids: these pests are dangerous to potatoes because they spread virus diseases. Destroy by spraying with derris or other safe material.

Potato blight: potato blight is one of the most common diseases the home grower encounters. A fungus disease, it is most prevalent in warm, wet weather, but it can occur at any time during the growing season. The disease produces dark brown-black patches on the leaves and stems; infected tubers have sunken areas on the outside with brown flesh underneath. The disease can spread rapidly and destroy the top growth completely in midsummer.

There are several precautions to take against potato blight. Protect plants by spraying with a locally approved fungicide in early midsummer, and repeat in wet weather according to the manufacturer's instructions. Blighted foliage should be cut and burned, and 10 to 12 days should pass before digging the tubers, which are still edible if you catch the disease in its early stages. Blighted potatoes should never be stored.

Potato wart disease: potato wart disease is another fungus disease. Affected tubers produce large irregular growths which look like cauliflowers. Infected plants must be burned, and potatoes should not be planted on the soil for at least ten years. The disease must be watched for in some areas.

Scab diseases: there are several scab diseases, all caused by fungus, which affect potatoes. Common scab is a superficial disease, affecting the skins of the tubers only, but it makes peeling difficult. It can usually be prevented by lining the drills at planting time with small amounts of lawn mowings. Peelings should be destroyed.

Powdery or corky scab is more serious. It causes round swellings on the tuber skins, which rupture and release a brown, powdery substance. The symptoms can be very severe on wet soil, and the potatoes can be destroyed. The soil can remain contaminated for several years, so avoid growing potatoes on the site of an outbreak.

Blackleg: blackleg is a bacterial trouble which affects an occasional plant within a crop. The stems blacken at the soil level, the leaves turn yellow and the stem withers; tubers rot where they are attached to the stem. Dig up infected plants and destroy them.

Virus diseases: leaf-roll, mosaic disease and spraing are all virus infections. Leaf-roll, the most common, is easily recognized by the curling, leathery leaves. The plants are undersized and the tubers are few and very small. The disease is carried in the tubers, so never save tubers from infected plants for planting out the following year. Mosaic also produces yellow markings on leaves; others give brown lines in the tuber flesh. Avoid these virus infections by planting only certified disease-free seed.

Brian Furner

Katahdin

Potato Marketing Board

Early Ohio

Varieties

Early

Cherokee: medium early. Round, smooth, creamy white; good cooker. Resists scab, late blight, mosaic, necrosis.

Early Gem: a western russet; cooking fair to good. Medium long; shallow eyes. Keeps well but cracks in wet seasons. No scab.

Early Ohio: good for Red River gumbo and northern sands. Medium, oblong, pink; a good cooker; virus and wart susceptible.

Irish Cobbler: rough with deep eyes; variable yielder. Good cooking. Dependable, grows nearly everywhere.

Norgold Russet: especially for northern plains. Long-oblong, shallow-eyed; golden russet. Short keeper; off-type in dry soil.

Norland: also for North. Short, oblong, deep red; shallow-eyed. Very early, good for fresh use. Resists scab.

Midseason

Chippewa: good for heavy soils. Elliptical, smooth, shallow-eyed; cooking good to poor. Wart, leaf-roll, spindle-tuber susceptible.

Reliance: round, white, shallow-eyed; poor chipper, best for fresh use.

Stately: Originated in Alaska; round, white, shallow-eyed. Low yielder, moderately solid. Tends to many small ones.

Brian Furner

Cherokee

Brian Furner

Stately

Grand Falls: sets tubers early; good cropper. Round-oblong, white, shallow-eyed.
Kennebec: midseason standard. Good for chipping, French fries, etc.; susceptible to wilt.
Plymouth: a high yielder, good cooker; oblong-flattened, shallow-eyed. Resists scab and blight.

Late or maincrop
Houma: a deep South origination. Late, round, white; of medium size with shallow eyes. Solid; resists necrosis and wilt diseases.
Katahdin: an old standby and standard of quality for years. Keeps well. Cooking medium to good.
Menominee: round, slightly russeted; has a long dormancy (a good keeper).
Ontario: high yielder; often sprouts at end of tubers. Oblong, smooth, shallow-eyed. Quality variable. Good in scabby soils.
Russet Burbank: very late. Long, cylindrical; excellent for storing and French fries. Best in Northwest.
Saranac: resists ring rot and late blight; small, round, white, shallow-eyed.
Shosoni: Idaho originated; round, lightly russeted. Medium eyes, yield suitable but solidity and appearance not best.
Triumph: good in South and Midwest; red, large, round, medium-eyed. Fairly mealy; disease-susceptible.

Brian Furner

▲ *Irish Cobbler*

Harry Smith

▲ *Red King Edward, popular abroad.*

Brian Furner

▲ *Grand Falls*

Brian Furner

▲ *Houma*

growing ideas

Halloween Favorite

Traditional symbols of the harvest season, pumpkins make a colorful and delicious alternative to squash.

Pumpkins are members of the *Cucurbitaceae* family, close relatives of summer squashes and are cultivated in much the same way. It is thought that they may be native to America, and they have been cultivated here since prehistoric times. There are two sorts of pumpkin, *Cucurbita pepo* and *C. mixta,* usually referred to as cumshaw pumpkin. *Cucurbita pepo* is actually a sort of winter squash, and it is this type which is usually grown. These pumpkins are round and bright orange, perfect for Halloween jack-o'-lanterns and as centerpieces for the harvest festival display. Pumpkins can grow to enormous sizes; fruit weighing 165 lb (75 kg) have been recorded, although the ones in your garden are more likely to weigh about 12 lb (5 kg) or less.

If you want to grow pumpkins, remember that they are only half-hardy plants and not very tolerant of unusually cool conditions. They need a long growing season and they must have summer heat to ripen successfully. Remember also that pumpkins take up a lot of room in the garden in proportion to the amount of fruit they produce. Obviously not a good choice for a small garden, but an interesting and unusual crop to try if you have the space. One way to make the most of your space when you want to grow pumpkins is to combine two plants in the same area—by sowing a few pumpkin seeds in a row of corn. Another is to grow bush pumpkins, plants that are only 3 ft (1 m) across. Yet another space-saver is to train vine varieties to grow on supports.

Pumpkins need a well-drained soil that is very rich in organic matter. Like squashes, they were grown at one time on rubbish heaps, and they can still be grown on a compost heap. They grow

sowing pumpkin seed

well in light shade as well as in direct sunshine—unusual among vegetables. However, it is better to choose a sunny, open site with a rich, well-drained soil. Before planting, dig in plenty of well-rotted garden compost or farmyard manure.

The temperature required for germination is quite high—a minimum of 70° F (21° C). Seed should germinate in one to two weeks.

If you live in a reasonably warm area, sow in late spring in the open ground. The plants must be at least 3 ft (90 cm) apart in all directions and you could allow 4 ft (1.2 m) if you have the room.

Prepare mounds for vine and bush varieties by digging holes 2 ft (60 cm) across by 1 ft (30 cm) deep. For vine types, make holes 8–10 ft (2.4–3 m) apart; for bush varieties, 4 ft (1.2 m) apart. Place a bushel of compost or well-

Halloween Favorite

Yves Lanceau

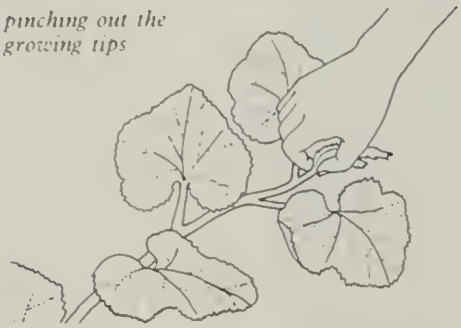
Part of the fun of growing pumpkins is to try to produce as large a fruit as possible. With warm weather and liquid manure, you can produce specimens weighing 22 lb (10 kg) or more.

rotted cow manure into each hole and then shovel the soil back in. This forms mounds about 4 in (10 cm) high in which you plant 4–7 seeds in a circle, 1 in (2.5 cm) deep. As seedlings appear on each mound, leave one or two of the strongest and cut off the rest.

Immediately after planting, mulch the surrounding area with well-rotted garden compost to help retain moisture, supply nutrients and keep down weeds. This is not necessary for plants grown on a compost heap. Pumpkins need plenty of water and nutrients to grow, so be sure to water frequently and repeat the mulch in midsummer. Keep down weeds, as they can absorb the moisture and nutrients intended for the crop, but be careful when hoeing not to disturb the shallow roots.

Pumpkins grow into large plants which take up a great deal of space. A well-rooted plant can send out stems 12–15 ft (3.6–4.5 m) long if left to grow untrained. Therefore, it is a good idea to pinch out the tips of the vines when between two and four fruits have formed; this will control the size of the plant and concentrate growth in the fruit.

Any fruits which set in excess of your requirements should be removed. Those remaining should all be about the same

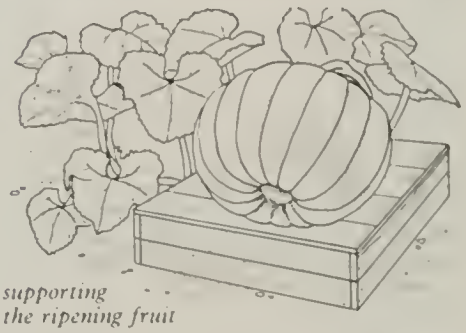


size, otherwise one can develop at the expense of the others.

Part of the fun of growing pumpkins is to try to produce an enormous fruit, either for exhibition or for a harvest festival. If you would like to try this, then limit each plant to a single fruit, and feed every week with a dilute solution of liquid manure or soluble fertilizer. If you are lucky, and if the weather is warm enough, your pumpkin should reach at least 22 lb (10 kg) by harvest time.

As the pumpkins begin to grow, place tiles or pieces of stiff cardboard under the fruits to keep them off the ground and prevent rotting. Pumpkins must be allowed to ripen on the plant. This can present a problem in years of early autumn frosts, for frost damage may prevent further ripening. In humid conditions, pumpkins are susceptible to the fungus disease powdery mildew. If unchecked, leaves and stems become coated with patches of powdery growth and may turn brown and shrivel. At the first sign of whitish spots on plant leaves, apply an approved fungicide. Pumpkins also can be attacked by aphids, the most common of garden pests. These should be knocked off plants with a good stream of water from your garden hose.

A ripe pumpkin has a hard, shiny orange outer skin. You should not be able to pierce any part of the skin with a fingernail. Cut ripe pumpkins, leaving about 3 in (7.5 cm) of stem on the fruit, using a sharp knife. Pumpkins will store well for several months if kept in a dry, airy, frostproof place. Do not allow them to touch each other, or they may rot. In any case, check occasionally for any signs of rotting, and use any pumpkins which begin to feel soft.



Pumpkins can be substituted in any recipe for summer squash. Or you can try making the traditional American pumpkin pie, spiced with cinnamon and sweetened with brown sugar.

Brian Furner

▲ *Pumpkins seeds are a rich source of vegetable fats and protein. Fry and salt them and eat them as snacks.*